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THE accumulation of back numbers of the *American Architect* has become so cumbrous that we have decided to follow the rule adopted by other publishers, and hereafter we shall keep in stock only the issues of the preceding five years. With the first of the year, the numbers of this journal issued between January 1, 1876, and December 31, 1881, will be "ground up" for paper stock. It is a great waste of good material, but it cannot be helped. Between this time and the end of the year, architects who have had designs, or writers who have had articles published in these moribund issues, and would like to procure extra copies of them can do so now by purchasing not less than ten copies of the paper containing them, at the rate of five cents per copy. Draughtsmen and others who have not the issues of the above-named six years, will find this a good opportunity to procure valuable professional material.

BOSTON is in the midst of a discussion about the enlargement of the Massachusetts State-House, which stands in the most conspicuous situation in the city, and has become too small for the business to which it is devoted. One or two volunteer plans are said to be in process of preparation for the enlargement, but of these the general public knows little or nothing, and contents itself with discussing the methods in which additional ground shall be secured for the extension. The most obvious way of obtaining this would seem to be to condemn and appropriate the necessary territory adjoining the west side of the present State-House lot, which can be done without inconvenience, but this will be expensive, and a large party of citizens, headed by the Mayor, wish, instead of this, to take a row of houses across the street from the present State-House, together with a large vacant lot at some distance beyond, separated by other streets, and at a much lower level than the State-House, and utilize them for building detached structures for the State business, connecting them with each other, and with the old building, by means of covered bridges. As we understand from the newspapers, any one who criticises this plan, which will cost about a million dollars less than the other, is denounced as an architect hungry for the job of spending an extra million of the public money; but we are willing to run the risk of this for the sake of fulfilling what we conceive to be our duty in protesting against any such mean and ridiculous scheme. If the State of Massachusetts were in the last stages of poverty, or had recently repudiated its debts, or were for any other reason compelled to adopt a miserable makeshift in place of a decent and convenient arrangement, we would not say a word; but it is not; and we do not believe that its inhabitants, if they can be brought to understand the plan, will ever consent to have its principal building, the seat of that Great and General Court which has managed its affairs so well for two hundred years, made into a laughing-stock for the people of other communities. Let the citizen who thinks that his part of a million dollars is worth saving imagine, let us say, that he receives a visit from a cousin living in Texas, or Georgia, or Indiana, or any one of a dozen commonwealths, not half as rich or cultivated as Massachusetts, which have recently erected magnificent public buildings; and that he sets out with him to show him the architectural glories of Boston. "You remember the State-House, don't you?" he asks, pointing with just pride to the splendidly situated little building with its gilded dome. "Oh yes," the Texas man replies, "but how small it is. The whole affair would about go into the rotunda of our State-House. Besides, I thought it had been enlarged recently." "So it has;" answers the Bostonian, "there is more of it across the street, over in that corner;" and as they pass under the "covered bridge" which ties, as in a planing-mill, the nearer portions of the seat of government, he points down the hill and adds, "There is still more of it down there, behind those little buildings, where you see the engine-house. You can get to it from here by going through this building, then down three flights of stairs, and across a bridge, and then down another flight of stairs, which brings you to the Hall of State." The Texan coughs slightly, and makes no answer as his host eagerly explains that by this system of planning the State saved a good deal of money, besides utilizing an unsaleable lot which paid no taxes, but we venture to say that before the Bostonian gets home with his guest he wishes that this particular economy had not been necessary, and if he could have the business done over again he would vote to make the State-House more like those which other respectable people build. What, we should like to ask, would be thought in Boston of a man who built a part of his house in a good situation, and to save expense, bought sites for the remaining rooms in his neighbor's back yards, connecting them together by "covered bridges?" There is no place, perhaps, where a man who economized in this way would be more unmercifully laughed at, and yet the Mayor of the town seriously proposes that the City and State shall spend three million dollars in making themselves similarly ridiculous, and, what is worse, many of the inhabitants favor the scheme.

THE other argument of the friends of the economical plan, that the proportions of the present State-House will be left by it undisturbed, has weight mainly on sentimental grounds. The building is well proportioned enough, and crowns with remarkable grace the distant outline of the city, but its principal claim to preservation rests on the associations connected with it. The gilding on the dome we could ourselves cheerfully see dispensed with. We can remember when there was nothing but yellow paint on it, and the gold-leaf coating, which has to be renewed every ten or twelve years, and costs each time nearly as much as the entire original cost of the dome, adds very little to the appearance of what is, unfortunately, a combustible mass of woodwork, which menaces every day the destruction of the valuable property stored beneath it. If the building can be enlarged without altering the present central portion, there are many reasons why this should be done, leaving the reconstruction of the central portion to the time when it shall have become too rotten or rickety to stand up any longer; but for the permanent part nothing ought to be thought of for a moment except the most convenient and dignified building that the State of Massachusetts can obtain, not highly ornamented, if the people wish to save expense, but at least not divided into fragments, and distributed among the cheap lots in the neighborhood.

THE New York Board of Aldermen have just contributed to the amusement of mankind by solemnly, and with a very large majority of votes, passing a resolution to the effect that "for the better protection of life and travel in the city, no steam-heating pipes hereafter laid shall be allowed to carry more than fifty pounds to the square inch, and that all permits heretofore given for more than this pressure be revoked." Although a faint show of reasons in favor of this movement was made, it is understood that it is simply an

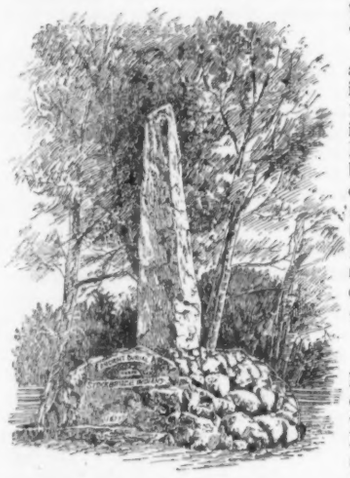
attack upon the New York Steam Company, which has, for some reason, incurred the malice of the labor reformers. As this company, in order to deliver steam at a distance under a suitable pressure for hoisting and other machinery, must keep that in the mains nearest its boilers at a tension of considerably more than fifty pounds, it is obvious that the compulsory reduction of the pressure in the mains will necessitate the abandonment of contracts for furnishing high-pressure steam at a distance, and a more vicious blow could hardly have been aimed at the company. The officers of the latter represented, with considerable force, that their pipes took the place of steam-boilers, which in New York are very commonly placed under the sidewalks, and that such boilers, which are by ordinance allowed to carry one hundred pounds pressure, are a good deal more dangerous to "life and travel" than pipes under the same pressure; but this reasoning did not seem to be favored with the slightest attention. On the contrary, the principal advocate of the resolution explained that the company was a "monopoly," and that if it were not allowed to supply steam, the owners of buildings would be compelled to put in boilers and employ engineers; and he might have added, with truth, that these engineers and their friends would probably vote at the next election for the return of their official benefactors to their high station. This reasoning must have sounded rather strangely from the Board which granted the Steam Company its permission to lay pipes in the streets, and, to do the gentleman who offered it justice, he supported his theoretical objections to the company's operations by informing his auditors that "the frequent bursting of the pipes created malaria in the ground, which was dangerous to health." By the bursting of pipes we suppose that he must have meant the leakage of joints, as we do not remember the bursting of any of the company's pipes; but the notion that the steam "creates malaria in the ground" is a novel one. It is not many months since certain Boston officials were zealous in compelling the application of steam, under a patented process, to bales of rags, for the purpose of destroying the malaria contained in them, and the idea that what cures in Boston will kill in New York seems at least to lack a precise scientific foundation. As to the other dangers to be apprehended from the tension in the pipes; to say nothing of the expediency of substituting ancient steam boilers, in charge of average New York engineers, at one hundred pounds pressure, under the sidewalk, instead of the Steam Company's pipes at fifty pounds pressure, under the roadway, it may do no harm to recall the fact that another company was once very near getting possession of the streets of New York, which proposed to carry, not steam, but hot water, under a pressure of more than three hundred and fifty pounds to the square inch, in pipes beneath the roadway. Nothing was heard then about risk from malaria, or of the evil nature of monopolies, and very little about the real danger of the scheme; yet it is speaking within bounds to say that the peril to the public from the hot-water pipes would have been a thousand times as great as that which it suffers from the presence of the Steam-Heating Company's mains under the usual pressure.

WE notice that an attempt has been made among the poor pork-packers in Chicago to organize a coöperative packing-house on their own account, and that, being supported by the best workmen in the business, as well as by persons outside who would like to do something to help their fellows out of their trouble, it would very probably have been successful before now except for the opposition of the socialist leaders. That these gentlemen would oppose any such scheme was certain from the beginning, Satan himself not being more averse to holy-water than professional socialists and labor agitators to anything like coöperation or participation in profits among their dupes; but it is both surprising and saddening, as showing the power of the terrorism by which they domineer over the poor and helpless, to find that men of courage and substance enough to begin the enterprise should hang back because they cannot get the socialists' approval. According to the Associated Press despatches, the argument brought against the scheme in the socialist meetings is that it is "simply a coöperation of individuals in a corporation to gain money," and, if successful, the members would "acquire some wealth and thus adopt monopolistic tendencies;" and with these ridiculous pretences, as it appears, the measures for interfering with the scheme are to be justified. We should like to know how long in this country men who have the desire and the ability to work economically and effectively, and save up a little money to keep their wives and children out of the almshouse in time of misfortune, or, if their affairs are prospered, to serve as the foundation of an honest competency for their later years, are to be prevented from doing so by fear of the vengeance of labor organizations, the most prominent figures in which are usually those who use them simply, after extracting an easy living out of them, to discourage and degrade those whose superior skill they envy and hate. According to the accounts, the strike among the packers at Chicago which caused the distress out of which this movement for relief has grown was caused by an infamous and wanton trick on the part of one of the higher officers of the Knights of Labor, who, being a candidate for election to some profitable public position, conceived the idea that if the voting workingmen in his district should go on strike at the time of the election, he could depend upon their leisure for a full vote, and on their loyalty to their organization for securing their ballots for himself; and therefore issued an official order calling out all the men over whom his position in the order gave him authority. The order was obeyed, with that touching faithfulness characteristic of the "little people" whom such demagogues misuse so shamefully, and the men abandoned their work. As soon as intelligence of the strike reached the head of the organization, a thousand miles or more away, the order for it was countermanded, and the men directed to return immediately to their places. This decree, according to the press despatches, was telegraphed to the local official, the very man who ordered the strike, and who probably expected such a communication. Unfortunately for the workmen, it came before the election, and their worthy official, who had not yet used them as he wished, put it in his pocket until they had served his purpose. When he got through with them, as there was no further reason for withholding the order, he had it published; but by that time the packing-houses had got other men, or made different arrangements, and the victims of this atrocious fraud found themselves adrift in the streets. Now, as it seems, they are trying to undo the mischief inflicted upon them, by finding means of providing themselves with work and a livelihood, and are thwarted at every step by other professional "friends of labor," who, to judge from their talk, vie with their political friend in efforts to prevent them from "acquiring some wealth." The example of the Massachusetts coöperative shoe factories shows how successful these efforts are likely to be, but we are not without hope that in Chicago, the most energetically public-spirited, perhaps, of all our large towns, some way may be found for securing to the poorer citizens a little more liberty in the "pursuit of happiness" than is at present enjoyed elsewhere.

THE *Sanitary News* quotes from the London *Morning Post* an article upon the condition of the water-supply in the east end of that city, which shows a curious state of affairs. It seems that the London water companies publish monthly reports of the condition of the water supplied by them, and from these reports it appeared that the east-end water was "entirely free from living organisms," so that the *Morning Post* sarcastically observes that the "organisms" in the water must have been too large to get into the microscopes, and therefore escaped the vigilance of the examiners, but that it was certain that "organisms" eighteen inches long, in the shape of eels, had been found by some of the Company's customers in their pipes, and several of them had been made very ill by drinking water in which similar animals had died and decayed. The Company's officers, on learning this fact, hastened to explain it by saying that about three years ago, some of their filter-beds burst, and the unfiltered water which got into the mains carried with it some small eels and other fish. These, particularly the eels, came to enjoy their new home in the pipes, and not only grew but multiplied, so that there are now many of them there, ready to be drawn into the small pipes by the opening of a faucet, there to stick, and die, and decompose. How eels, or any other fish, can live and grow to be eighteen inches long, in iron pipes, containing only water from which every trace of "organisms" has been filtered out, no one seems inclined to explain, but they are certainly there, and, in spite of the efforts of the Company to flush them out, they seem to be increasing rapidly in numbers. What will be the end of the nuisance, we cannot pretend to say, but it is likely to be a serious one while it lasts.

EARLY SETTLER MEMORIALS.[1] — IV.

INDIAN MONUMENTS.



THE most sensible public monument in the United States, of which we have any knowledge, was erected in Stockbridge, Mass., in 1877, in the old Indian burying-ground in that village. It is in memory of the Stockbridge Indians, and consists of an unhewn shaft of stone, found in the vicinity, and a base made of rude boulders. In the summer and autumn months a beautiful vine covers the entire structure.

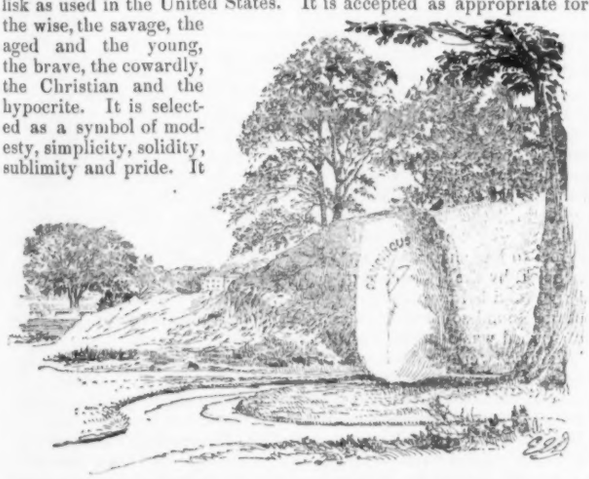
THE UNCAS MONUMENT, NORWICH, CONN.

The citizens of Norwich had long been desirous of erecting some memorial to their "old friend," the Mohegan sachem. During the summer of 1833, Andrew Jackson, President of the United States, with a part of his Cabinet, made a tour through a portion of the Eastern States. The citizens of Norwich wished to have him include that place among those he proposed to visit, and as an excuse for inviting him to do so they suddenly decided to lay the corner-stone of a monument to Uncas, to whom they were indebted for the very existence of the town. The invitation was accordingly given and accepted, and the corner-stone was laid in the presence of a large assembly of people, including a few Indians.

Though the corner-stone was thus auspiciously laid, no funds had been obtained or plans matured for the erection of the monument. But the ladies of Norwich with a spirit characteristic of the sex, took the matter in hand, by holding a fair in 1840 on the occasion of a mass-meeting in honor of Harrison and Tyler, and with the funds thus obtained erected a simple granite obelisk, with no inscription but the name — UNCAS — cut in raised letters on the base. It was coarsely executed in Quincy granite at the State Prison in Charlestown, Mass., under the direction and supervision of G. L. Perkins, Esq., and dedicated July 4, 1842, in the presence of a large concourse of people, with an address by Wm. L. Stone, Esq. It stands in Sachem's Burial Ground, which is the only aboriginal relic of any note in the town of Norwich, and the place of burial exclusively set apart, by the early settlers and the Mohegan chief, for the Uncas family.

Uncas died in 1643. Of his character there is a difference of opinion. Many declare that he left no very favorable record. General Gookin describes him as follows: "Unkus, an old and wicked man, a drunkard, and otherwise very vitious; who hath always been an opposer and underminer of praying to God." Others affirm that from the day when the Pilgrim Fathers planted their feet on the soil of Connecticut, this noble chieftain became their friend, and such he remained until the day of his death, involving a period of over half a century. And because of his fidelity very little English blood was shed by Indians upon the soil of Connecticut, while the border towns of Massachusetts were ravaged by scores.

Nothing could be more incongruous than an Egyptian obelisk set up in memory of an American savage. Nothing concerning memorials to the dead is more curious than the elastic capacity of the obelisk as used in the United States. It is accepted as appropriate for the wise, the savage, the aged and the young, the brave, the cowardly, the Christian and the hypocrite. It is selected as a symbol of modesty, simplicity, solidity, sublimity and pride. It



seems to be adapted to the purposes of commemorating important historical events, like the Battle of Bunker Hill, as well as a tribute of scholars to the memory of the founder of a great university, like the obelisk over the grave of John Harvard. Thomas Jefferson desired it as his monument, in the hope that it would not be carried away by relic-hunters. The United States Government built an enlarged obelisk in memory of Washington, because it was supposed to best agree with his character, and was the form that could be built to the greatest height for the smallest sum of money.

However slight it may be, there is a certain appropriateness in the Canonicus boulder, and it does not produce, as the Uncas monument, the unpleasant impression of pretence and incongruity in the mind of the observer. When this obelisk was being constructed, there was a great deal of anxiety concerning the right way to spell the name of the Mohegan chieftain, but history fails to shed any light as to whether any one was interested in selecting a form for his monument that would in the slightest degree allude to any phase of his life or character.

The Uncas monument is in keeping with its origin, showing neither care for, interest in, nor appreciation of him as a representative Indian, or his vital relations to the settlers of Norwich and the Colony of Connecticut. An obelisk, no matter how well made, has never had any human interest as a memorial of the dead. It has, however, a universal interest peculiar to its origin and purpose. Its form, according to modern interpretation, is the easiest and cheapest for grave-yard purposes, a convenient excuse for want of thought, and an accepted apology for ignorance. A large obelisk is an excellent and popular means of gratifying vanity. To be able to say that "it is the largest piece of granite ever quarried in the State" more than makes up for the absence of all the fine qualities of the human heart as expressed in other times in tributes to the dead. The Egyptians, though making their obelisks works of art, cut upon their sides some allusion to the human being, whose deeds were worth referring to, if by nothing more than a symbol. The one to poor Uncas has no more significance than it would have if it was set up for bean-vines to grow around.

THE MIANTONOMOH MONUMENT.

As late as 1770, there stood on Sachem's Plain, in the eastern part of the town of Norwich, a heap of rude stones between two solitary oak trees. It was an Indian memorial that had been gradually gathered since the death of Miantonomoh, the sachem of the Narragansetts. Being near an Indian route often travelled, it was visited by scouting parties of different tribes, and additions made to it alike by exultant foes and bewailing friends. All true-hearted Narragansetts who passed that way renewed their lamentations and cast a few more stones upon the heap, consecrating them with doleful cries and frantic gestures. Sachem's Plain was first made memorable by a battle between the Mohegans, under Uncas, and the Narragansetts, under Miantonomoh. The latter was taken prisoner and his warriors beaten and routed. Historians are not fully agreed whether the many-stoned pile marked the spot of the capture, execution, or grave of the Narragansett chieftain. The owner of the land, having no respect for this rare example of an aboriginal memorial, basely used the stones for the menial purposes of a barn foundation, the trees vanished in sympathetic protest against this shameful desecration, and nothing was left to mark the spot except a barren break in the ground upon which the grass refused to grow. On July 4, 1841, a few citizens of Norwich, led by Wm. C. Gilman, Esq., erected two blocks of granite upon the spot, reaching to the height of eight feet, and cut upon the top stone the simple inscription

MIANTONOMOH,
1643.

Of the character of this chief there is also a difference of opinion, evidently tempered by localities. In Connecticut he was regarded as an implacable and treacherous foe of the Indians and white settlers of the colony around Norwich; as possessing not one redeeming quality, and that the only act of his life deserving especial commendation was his reported order to those of his warriors who went

[1] Continued from page 218, No. 567.

against the Pequots, to spare the women and children. He was slain after he had been taken prisoner on Sachem's Plain, by the brother of Uncas, or one of his warriors, under the authority of the Colony of Connecticut, as a necessary and just punishment for repeated attempts to assassinate Uncas. The Rhode Island authorities, who held him in high esteem, regarded the death of Miantonomoh as no less than murder.

The rude style of the monument and its isolated position are quite in keeping with the savage nature it commemorates.

CAPTAIN JOHN MASON'S MONUMENT.

The record of Mason's death, in Rev. Simon Bradstreet's journal, is as follows: — "Jan: 30, 1671 (O. S) Major Jno. Mason who had severall times been Deputy Governr of Connecticut Colony dyed. He was aged about 70. He lived in the 2 or 3 last years of his life in extream misery with ye stone or strangury or some such disease. He dyed with much comfort and assure it should be well with him."

"Captain John Mason," writes Miss Caulkins, one of the historians of Norwich, "was one of the boldest champions of New England, the conqueror of the Pequots, and the preserver of the infant colony of Connecticut. He bore a large share in the hardships and dangers of the first settlement of the State, fought desperately in her first Indian wars, and assisted in her earliest councils.

"He sustained also for eighteen years the office of magistrate, and for ten years that of Deputy Governor of the Colony. On the settlement of Norwich he was one of the first movers, and may justly be considered the chief founder of the town. The last twelve years of his life were passed in the infant plantation, and here he died. According to tradition he was buried upon an undulating hill, near the Yantic River, in a spot reserved by the first settlers for a common place of sepulture. It is long since the grave of a single individual could be discriminated. The whole area, however, covered with graves was but eight or ten rods square, and within that space was the sepulchre of the hero. With so many claims to the gratitude and admiration of his countrymen, it is surprising that Captain Mason should have lain so long in an unnoticed grave. For 187 years he has reposed in the very center of his exploits, without a stone, or even a hillock of turf to mark the hallowed spot."

In 1859, on the two hundredth anniversary of the settlement of Norwich, a committee of representative citizens was appointed to collect funds necessary to repair this old burying-ground. The town appropriated three hundred dollars for a monument to Mason, and also "appointed a committee to determine the site for the same, and fix upon the inscription which should be placed thereon, and do all things proper and necessary in the erection of said monument." Twelve hundred dollars were pledged for the first object, largely by persons living in the Southern States. The corner-stone of Mason's monument was laid in the same year, not in the old burying-ground where his ashes repose, but in a new cemetery laid out by the town.

The war of the Rebellion soon after breaking out, intercourse between the North and South was suspended, the twelve hundred dollars were not paid, and the old burying-ground and the Mason monument were neglected. In 1871 a new committee was appointed to contract for and superintend the erection of such a monument as they should deem proper. They accordingly erected one at a cost of six hundred and fifty dollars, on land *adjacent* to that where the corner-stone had been laid in 1859. It bears the following inscription, as well as the names of thirty-six of the early settlers of Norwich: "Major John Mason, born in England, died in Norwich, January 30, 1672, aged 73."

One hundred and fifty dollars of the monument-fund remained in the hands of the committee after the monument was erected, and they thought best to reserve it for the purpose of keeping the monument in repair, and erecting in 1959 a larger and more imposing one on the green in Norwich town.

With this object in view, a company of fifteen of the principal citizens was incorporated by an act of the General Assembly of the State, in May, 1871. The site has been purchased, and the funds deposited in a savings bank, where, if carefully preserved, and the interest compounded semi-annually, it will amount to a very large sum in 1959.

If after two hundred years there existed only enough public spirit and gratitude in Norwich to cut the names of Mason and his fellow-settlers on a piece of granite, it may be safely concluded that at the end of another century they will be entirely forgotten. So far as the monumental story of Mason and his savage contemporaries goes, they are all on a level in the respect of those who have come after them. The savage friend, the implacable foe, and the sturdy preserver of the colony are one and the same. The Mason monument is the dreariest specimen of monumental mimicry we know of.

THE NORWICH SOLDIERS' MONUMENT.

This is one of those terrible objects in granite that began to come into vogue soon after the close of the Rebellion, and which have continued to increase until the present time. It consists of a piece of granite twelve feet high, cut in resemblance of a Union soldier, standing upon a pile of granite fifteen feet high. The cost of this pile was $18,000. Its history is in harmony with its character. Failing to collect money enough by voluntary subscriptions to build a memorial to the soldiers who risked and gave life and limb for their country, the town was obliged to lay a tax of fifteen cents on $100 of the assessment list. The committee who had charge of the affair was Hon. Wm. A. Buckingham, Hon. John T. Waite, and Hon. J. A. Hovey. So little is the monument regarded, that neither its designer or maker are mentioned in the "*History of Norwich.*"

If it is possible, it is more heartless than the Mason monument, because it is more pretentious, and because the purpose for which it was erected comes closer to human sympathy and grateful remembrance.

BATTLE OF GROTON HEIGHTS.

The battle of Groton Heights was not only the largest and most important military engagement that ever took place within the borders of Connecticut, but it was one of the most tragic and heart-rending events that ever occurred on this continent. Benedict Arnold, in command of three thousand British troops, sailed into New London Harbor on the morning of the 5th of September, 1781. While more than two-thirds of this force were, under his personal direction, burning, sacking, and outraging the inhabitants of the towns of New London and Groton, in the early part of the next day, the remainder were sent to attack Fort Griswold, which was situated in the latter town across the river from New London. The fort was mounted with thirty-three cannon of various sizes, and defended by one hundred and sixty white and two colored men, under the command of Colonel William Ledyard. This little garrison was composed of militia-men, continental soldiers, and citizens in all ranks and ages, with little training as artillerists, and hastily gathered together at a moment's notice. Before the assault began Ledyard was called upon to surrender, but he refused. After repeated assaults and a most persistent defence he was obliged to surrender to superior numbers. As Colonel Ledyard advanced to meet Major Bromfield, the commander of the British troops, the latter called out, "Who commands this fort?" "I did, but you do now," said Colonel Ledyard, extending his sword. In a moment Ledyard lay dead, thrust through and through by his own sword in the hands of the treacherous Briton.

The death of Colonel Ledyard was immediately followed by an indiscriminate massacre of the garrison, both wounded and living, until fifty-five were killed and entirely stripped of their clothing — many of them receiving several, and some thirteen bayonet stabs. Thirty-six of the dead were under forty years of age. One boy died there at fifteen, and another at seventeen years of age; one man at sixty, another at sixty-five, and another at seventy-five. Sixty of the dead and wounded were members of the Congregational churches of Groton and New London. Of the entire garrison all but eighteen were unmarried. Eleven bore the name of Avery, six of Perkins. Eye-witnesses state that the fort ran with streams of blood. Of those who survived this barbarity, thirty-five, more or less dangerously wounded, were parolled, and as many more, mostly wounded, were taken prisoners to New York. Most of them fought in sight, and all within hearing of their own friends.

"Not till the British fleet disappeared in the darkness on that fatal day did the wives and children, or fathers or mothers go to the fort to find their loved ones dead among heaps of slain, literally butchered by the barbarism of a civilized people worse than that of savages, and led by a traitor who in other years had known every foot of ground so bravely consecrated to a noble memory." Benedict Arnold was born in Norwich.

The dead were so thickly covered with blood and dirt and disfigured with wounds that their friends could not distinguish them. It is told of one woman that she washed the faces of thirty of the killed before she found her own husband.

The British lost one hundred and ninety-three officers and men — thirty-three more than were in the garrison — including the first and second officers in command. They made forty-four American widows.

The heroic, pathetic and appalling scenes which that 6th of September witnessed on Groton Heights would fill a book. Ledyard

himself was only forty-three years old. He left his wife on a sick-bed with a new-born child, to go to the fort, and, as he stood on its walls, whose construction he had directed, he saw the assaulting column trample over the newly-made grave of his daughter as it passed through the burying-ground. "What a story is this of Walter Buddington and his wife and child, who, in their home above the fort, ate their breakfast in silence and haste and, after the breakfast, he took down his musket from the deer-horn hooks above the mantel, and started for the fort. And all that dreadful day his wife and daughter sat upon the rocks and watched the battle and the conflagration, and never knew for a certainty whether husband and father was dead or alive until months afterwards the sickly and starved survivor of a prison-ship staggered across the familiar threshold and was at home again."

And such a piece of cruelty as this: "The British loaded the wounded members of the garrison into a cart and let it run down the hill without guidance until it struck against a tree, killing some of its occupants and horribly torturing the others." And this: "there was a well of water in the fort and, though its wounded defenders were dying of thirst, their conquerors refused to permit them to have a drop." The destruction of property amounted to more than $300,000. One hundred and sixty-five buildings and a number of vessels were burned.

The horrors of the massacre were made still more terrible by two fateful incidents which took place, one before and the other during the fight. Arnold says, in his report to Sir Henry Clinton, that "on gaining a height of ground in the rear of New London, from which I had a good prospect of Fort Griswold, I found it much more formidable than I expected — and, observing that it had received reinforcements from Fort Trumbull, I countermanded my first order to attack the Fort, but the officer arrived a few minutes too late. The attack had commenced." After the two chief officers of the assaulting party had been killed, the troops under them became discouraged and were about retiring, but a luckless shot cut the halyards of the flag of the fort, and it fell to the ground. The enemy, supposing that the flag had been struck by its defenders, rallied again, and rushing with redoubled impetuosity, entered the fort. Until this time only seven of the garrison were killed and eighteen wounded.

"Could the battle have been prevented in accordance with Arnold's orders, or stopped before that flag fell, Groton Heights, instead of a high altar on the earth, bathed with sacrificial blood, would have become a field of victory, a plain of triumph."

The results of Arnold's expedition were so unimportant to the British cause, and his loss of men so heavy that Sir Henry Clinton made no attempt to disguise his feelings of disappointment. Arnold not only makes no reference in his report of the treacherous conduct of the conquerors of the fort, but says that Colonel Ledyard and his men were found dead, and that Major Bromfield, who was in command of the British troops who entered the fort and who murdered Ledyard, behaved with great honor. British historians accepted this report, but Botta very justly pronounced it a piratical expedition, of no value to the British, and signalized by the most horrible devastations. It was the end of Arnold, as the British never afterwards entrusted him with a command.

THE OLD GRAVESTONES.

The martyrs of Fort Griswold left to their widows and orphans poverty, debts, and suffering. Yet, the gravestones these bereaved and desolate families erected, form, even at this day, not only the best collection of revolutionary memorials to be found in the entire country, but they are the best examples of the different styles they represent. They have an added interest and superior significance very rare even in these more favored days, in that they are the very best expressions of cemetery memorials that could be obtained at the time of their erection. No gravestones since erected in the United

States have anything like such excellent proportion, imposing style, such complete fulness of design. We regret that we can give but three examples of the fifty-two erected.

"On visiting these solitary places of interment and reading from the stones the rudely-cut epitaphs which sometimes breathe a spirit of resignation and Christian hope, but far oftener that of defiant and fiery indignation, the visitor realizes more than ever before the extent of the desolation and woe spread throughout this region by the invasion of the traitor."

INSCRIPTIONS AND EPITAPHS ON THE OLD GRAVESTONES.

"In memory of Mr. Rufus Hurlbert, who fell in the bloody massacre committed by Benedict Arnold's troops at Fort Griswold, September the 6th, 1781, in the 40 year of his age.

"Reader consider how I fell For liberty I blead Oh then repent ye sons of hell For the innocent blood you shead."

"Will not a day of reckoning come does not my blood for vengeance cry how will those wretches bear their doom who hast me slain most murderously."

"By God's decree my bounds ware fixt, the time the place, the means though vile, & whilst I blead, the views of bliss, Faith triumphed over Monster Death."

"Ye patriot friends that weep my fate As if untimely slain Faith binds my soul to Jesus' breast And turn my loss to gain."

"This gallant soul when God Doth call doth give his life in freedom's cause; a sudden dart doth wing away that pricous life that dwells in clay."

Save the old burial-ground at Plymouth, there are no localities in the United States so touching as the graveyards of Groton, and those of the immediate vicinity, where repose the sacred dust of these defenders of their country. T. H. BARTLETT.

[To be continued.]

CONVENTION OF THE WESTERN ASSOCIATION OF ARCHITECTS.[1]

SECOND DAY.

COUPLED CAPITALS FROM THE CLOISTER VAISON.
FROM REVON.

THE convention was called to order one hour late, and the reading of the minutes of the previous day's session was dispensed with. Mr. D. Adler presided, and Mr. John W. Root acted as secretary.

The Executive Committee reported the following members for election: Fred. Kees, Minneapolis; F. J. Grodavent, Leavenworth, Kans.; Merritt J. Reid, Evansville, Ind.; J. Mulvey, Aurora, Ill.; Wm. Zimmerman, Chicago, and they were elected.

As several members were yesterday admitted under a misapprehension of the rules requiring all members to be exclusively engaged in the practice of architecture, it was voted that their election be reconsidered, rescinded, and the persons so elected be notified that they were ineligible.

Mr. C. A. Curtin, of Louisville, moved that the same action be taken concerning the members elected at previous conventions. It prevailed.

Mr. W. W. Boyington, chairman of the committee on raising the standard of requirements for admission, reported that Article 4 of the Constitution covered all the points necessary.

Mr. Sydney Smith, of Omaha, moved that all applicants be voted on by ballot by members in open convention, and that five votes against an application be enough to defeat it. This was discussed by Messrs. J. W. Yost, of Columbus, O.; F. G. Corser, of St. Paul; Sidney Smith, of Omaha; P. P. Furber, St. Louis; C. A. Curtin, of Louisville; and E. F. Fassett, of Kansas City. After two members had offered amendments, and had them defeated, Mr. Smith's motion was carried.

Mr. J. F. Alexander, of Lafayette, Ind., moved that the Secretary be authorized to furnish each member with a properly-engraved certificate of membership, under the seal of the Association.

Mr. L. S. Buffington moved that the Board of Directors issue to each member a certificate of good standing in the profession, and that the bearer is now and has been in actual practice three years. Some objection was made to this, and Mr. Buffington's suggestion was defeated. After a lively discussion the subject was postponed until next year.

Telegrams were read by the secretary, from Mr. A. J. Bloor, on behalf of the Board of Trustees of the American Institute of Architects, stating that Mr. W. L. B. Jenney, of Chicago, was directed to represent the Institute at this meeting, and sending greetings to the sister association of the West.

A paper was then read by Dr. Oscar C. DeWolf, Health Commissioner of Chicago, on "The Relation of State Medicine to the Profession of Architecture." State medicine was "like wit, much talked of, not to be defined." What if a man employ the lineal descendant of Vitruvius Pollio to design a mansion, if the sanitary conditions be disregarded by the State? Without State medicine the architect may build a house in vain. He may successfully cope with the vicissitudes of climate; he may provide for seismic phenomena, etc., only to find his best efforts set at naught by conditions which legalized authority alone can satisfactorily adjust or remedy. It may be true that some architects are open to the charge of being behind in sanitary matters, but not those who belong to the Western Association

[1] Continued from page 264, No. 570.

of Architects. Some architects experience trouble by not recognizing its root, the essential difficulty being cost.

Dr. DeWolf then took up vital statistics, showing that vitiated air greatly increased the sickness and deaths from lung diseases. A charter of health should show a house to be non-dust-collectable, easily purified of impurities, free from damp, filled with daylight, supplied with pure air, kept at an even temperature, and supplied with pure water. He told of the attempts which would be made to secure the passage of a law regulating sanitary building in Illinois, to supplement present legislation. He compared the health of Pullman, with its sanitary regulations and conditions, with Hyde Park of which it is legally and territorially a part, showing the death-rate in Hyde Park to be 15 per 1,000, while in Pullman it averages but 6.9 to 7.6 per 1,000. In closing he said: "If, as Sallust says, 'every man is the architect of his own fortunes,' you, gentlemen, are more than the architects of your own. To your professional intelligence, sincerity and skill, every man must trust for that without which fortune is but a Dead Sea fruit — a healthy life."

A paper was then read by S. G. Artingstall, C. E., city engineer of Chicago, on "Proportion of Joints and Connections in Framed Structures," in which he stated that joints were generally the weakest parts of iron constructions. They should be proportioned to resist every direct and indirect stress laid upon them legitimately. When the bearing surface on the plate is too small, riveted joints and connections are subject to injury by tearing the rivets through the plates, and by shearing the rivet when there is too low a rivet section. Rivets are better when put in hot. Rivets should be arranged symmetrically with reference to the axis of each bar. The paper also took up "pin connections," and was of such a character that a useful abstract could not be made of it. In closing, he said: "Make all parts of a joint or connection as suitable as possible; avoid all complicated or twisted pieces, particularly the bending or forging of shape iron."

Mr. W. W. Boyington, of Chicago, then read a paper treating of his personal experiences in building foundations on Chicago soil; it was illustrated by large drawings.

After Mr. Boyington finished, the committee to report upon the advisability of changing the sub-division of the standard foot of measure from duo-decimal to decimal subdivisions, reported, recommending the appointment of a committee of conference with other interested societies. Discussion on the report was postponed until some later time in the proceedings.

THE LUNCH.

Upon invitation of the Illinois Association of Architects, the members adjourned to Kingsley's restaurant, and partook of a very agreeable informal lunch.

SECOND SESSION.

The Association was again called to order in the assembly rooms at 4 : 10, and proceeded to the reading of papers, and the president called on Prof. N. Clifford Ricker, of the architectural department of the Illinois State University at Champaign. His subject was "Architectural Grammar," and in it he studied architectural types and forms, and their variations in different buildings when constructed under different costs. Each style has its genius, and genius is not exhausted. Grammar in language is a dry study, and teaches the proper arrangement of words into sentences; but it is not the only use of grammar. It should supply us with a complete body, bones, flesh and soul, of literature. Architectural grammar should be something similar. It should not only teach us how to erect the simple structure, but should show us the complete method of decoration and ornamentation. This can be done in two ways, by varying the treatment of different portions of the building, and by using the various arts of building, such as sculpture, furnishing, etc. If the different styles employed by different peoples be examined carefully, and a standard decided, it could then be judged how closely any building neared the perfect type of the style in which it is built. He paid Ruskin great credit for being the leading writer on architectural grammar, but he was more particularly wedded to the Italian and French styles. The lack of reliable text-books on architecture were deplored, and different methods practised in different schools were described and their faults pointed out. The efforts which must be put forth in this country in order to create an American style were touched upon; the natural features of the country and the growth of art in large cities gave hope for a rapid development of an American architecture.

The Board of Directors reported as eligible for membership: Henry Wolters of Louisville, F. Heer, Sr. of Dubuque, E. J. Eckels of St. Joseph, Mo., and Henry T. Kley of Chicago, were balloted on. They were all elected.

Mr. Isaac Hodgson, of Minneapolis, then read an epigrammatic paper on "Hints on a National Style of Architecture," in which he stated that in creating an American architecture, the architects were laboring under a great mistake, and a radical change must be effected. The taste of the votaries of the fickle god must be educated and enlarged. The Western Association contained the material which could be used to develop this taste. He did not undervalue the ancient styles of architecture, but the times were ripe for something other than the old types which had been put in books for years as typical styles. No temples to mythical gods were needed now, but the temples of the present day were the homes of the people, where a real God can be worshipped. All honor should be paid to the fathers of our art, but justice should be done to ourselves. The ideal style should be left in the past, where it undoubtedly belongs. It is the peaceful arts which make a people great. Our age is a glorious reality. We should strain every nerve to obtain the best result with the most simple action. Of all men and professions, ours should take the front. The legitimate profession will be held responsible for every architectural abortion, no matter by whom erected, and the architects must see that this is not the case. He stated that it was absolutely our duty at once to proclaim a higher standard and to proceed to establish a modern school, based on rational principles exclusively. The title should be the "American School of Architecture." Only members of the Western Association and the American Institute of Architects in good standing should be admitted. Members should be obliged to pledge themselves as follows: —

1. That they will faithfully and honestly, to the best of their ability, endeavor to improve the civil architecture of America, and that they will render all the aid in their power in the introduction, development and perfection of the national style of architecture known as American.
2. That in doing so, they will, in the construction of buildings of every class, be wholly governed by the laws of mechanics or scientific rules on the subject.
3. That they will confine themselves, as far as practicable, to such simplicity and breadth of design as will produce the longest unbroken perspective lines, and greatest dignity and repose in all their works.
4. That they will carefully study and practise economy — using only such quantity and strength of materials, of whatever kind, as shall be warranted and justified by the accepted authorities on the subject.
5. That they will strictly observe the law of practical fitness — excluding all barbaric crudeness, massiveness and severity, and give a truthful and spirited expression of purpose to all their creations.
6. That in the matter or fenestrations of every structure they will introduce any and every form of arch and lintel that will serve convenient, practical and æsthetic purposes.
7. Regarding columns, pillars, etc., that they will introduce parallel shafts and regulate their height by the safe value and measure of the material employed in their make-up to safely sustain the superimposed loads. And that, when in order, they will boldly and gracefully mould their bases and capitals — enriching the latter with spirited carvings representing native fruit, flowers and foliage, or geometrical patterns, or both.
8. That in all lintels, archivolts, voussiors, etc., the actual known value of the material used to sustain their own and superimposed loads shall be their dimensions.
9. That they will not project belt-courses, cornices, copings, pediments, gables, etc., over the sustaining wall-line, to a greater extent than that which is necessary for protection and, when enriched, ornamental purposes.
10. That in the roof and chimney-shafts, parapets, etc., of all their structures, they will endeavor to produce the best picturesque effects in the most unpretentious and monumental way, avoiding unnecessary breaks and, as far as is practicable, unequal angles in the roof contours.
11. That when dormers are introduced they will endeavor to make them important, not numerous, features, and gracefully embellish them to properly relieve the broad roof-surfaces.
12. That they will introduce no exterior decoration except that which is necessary to properly accentuate and relieve broad, plain surfaces — using geometrical patterns, native plants, foliage, fruits and flowers, and appropriate selections from the lower animal kingdom for the purpose.
13. That they will, in all interior decoration and finish, endeavor to produce harmony with the exterior, except where it may be necessary to vary for special and convenient purposes.

Mr. E. H. Ketcham, of Indianapolis, then read a paper on "Insane Hospitals." One in every five hundred and fifty-eight persons in Indiana is insane. In Cook County, Ill., one in every three hundred and ninety is insane. The corridor, the pavilion, and the cottage systems were described with their advantages and disadvantages. The peculiarities of the American location of administration-rooms in the centre, with boiler-rooms at the rear was noticed. In the new asylums of Indiana the home or house feature is carried out to a greater extent than elsewhere. Three types were used in Indiana. The Northern Hospital at Logansport was patterned on the pavilion design. Each building is complete in itself. The Eastern Hospital at Richmond, is designed on the cottage principle, the home being as nearly copied as is possible. The Southern Hospital is more on the old corridor system, save that all wings are separated, instead of being joined at the center. The method of ventilation was described; water-closets are all placed outside the building, connected with it by corridors, preventing the entrance of foul air. The roof is of the well-known "slow-burning" construction.

An adjournment was had until 10 o'clock, Friday morning.

THIRD DAY.

At the opening of the session, Mr. N. S. Patton offered a resolution to the effect that the Association recommend the adoption of the metric system of weights and measures, and that the President appoint a committee of three, whose duty it shall be to correspond with other organizations interested in this subject, and in connection with them petition Congress to pass a law making the use of the metric system compulsory, after a reasonable period. It was carried.

Mr. John W. Root offered amendments to the constitution taking away the right of other organizations of architects to elect members to this Association, and making members, who, after three years' active and honorable practice in architecture leave the profession, honorary members. The amendments were carried.

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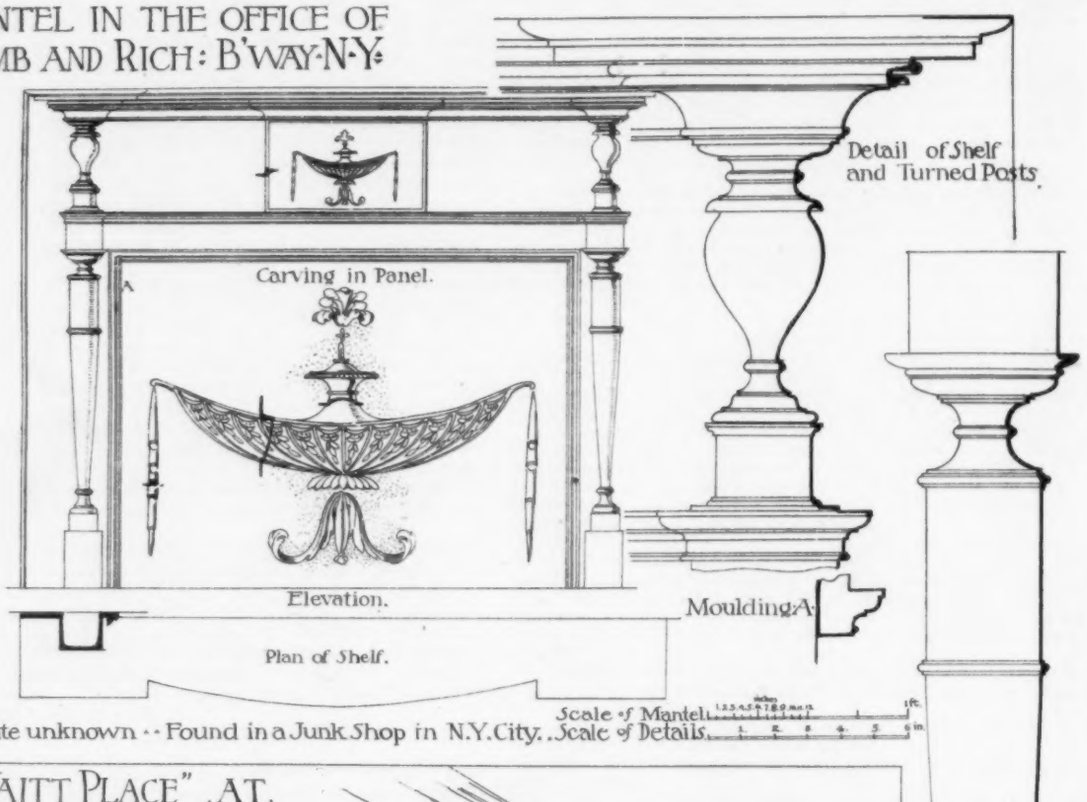
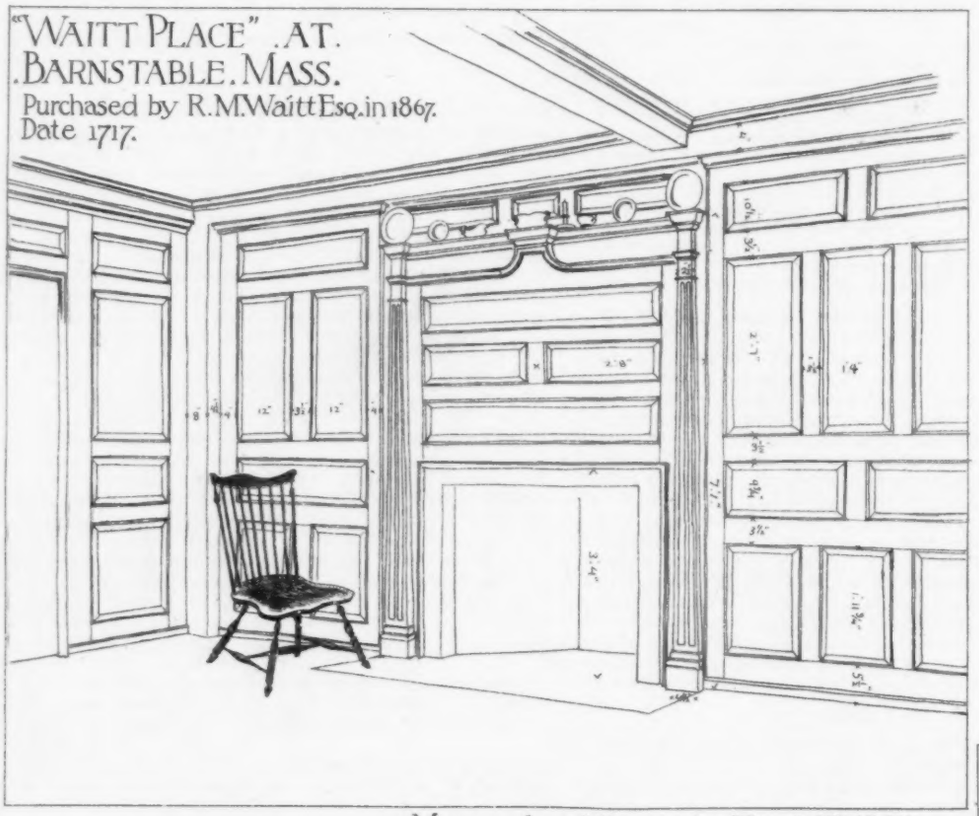
Mantel in the Office of Lamb and Rich: B'way N.Y.



Date unknown .. Found in a Junk Shop in N.Y. City.

"Waitt Place" at Barnstable, Mass.

Purchased by R.M. Waitt Esq. in 1867.
Date 1717.



Measured and Drawn by Frank E. Wallis.

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Old Colonial Work,

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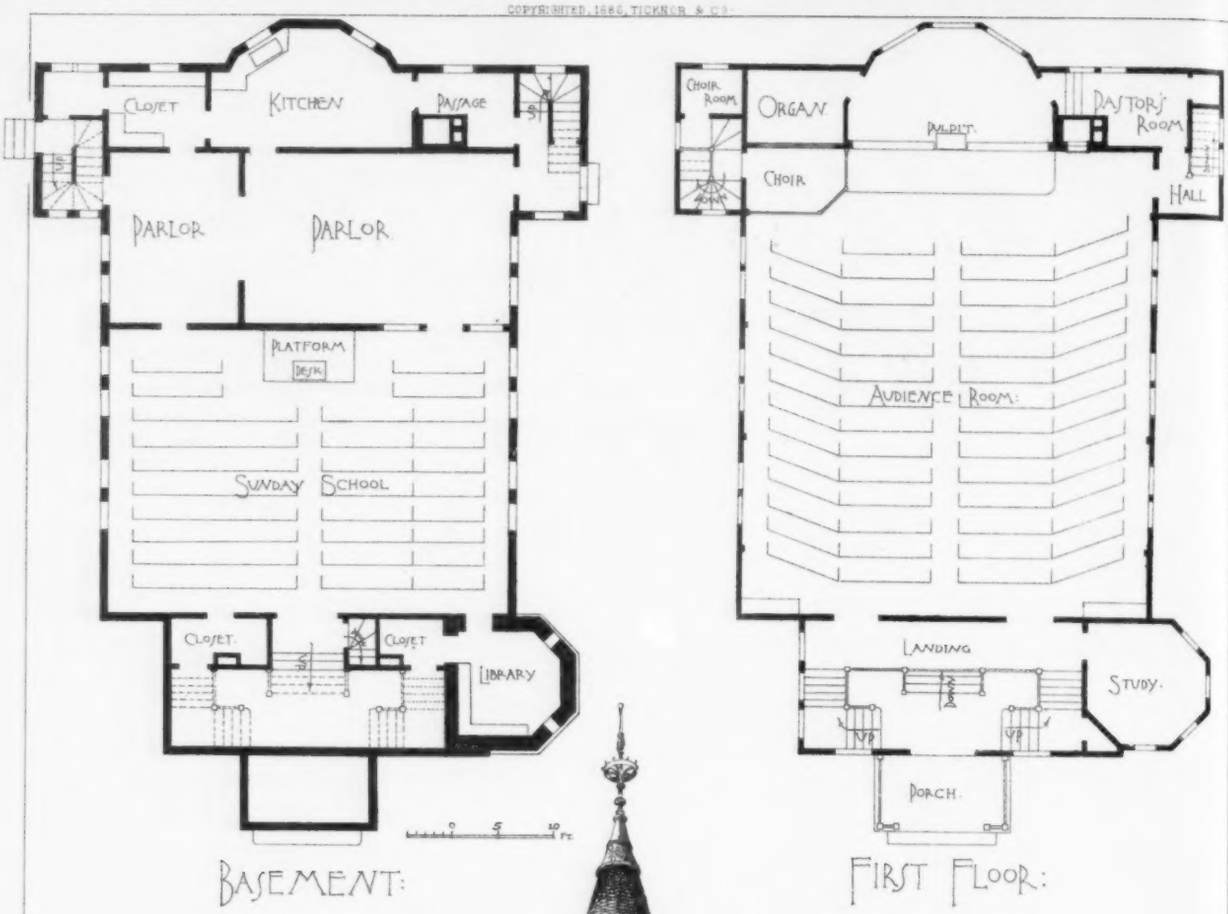
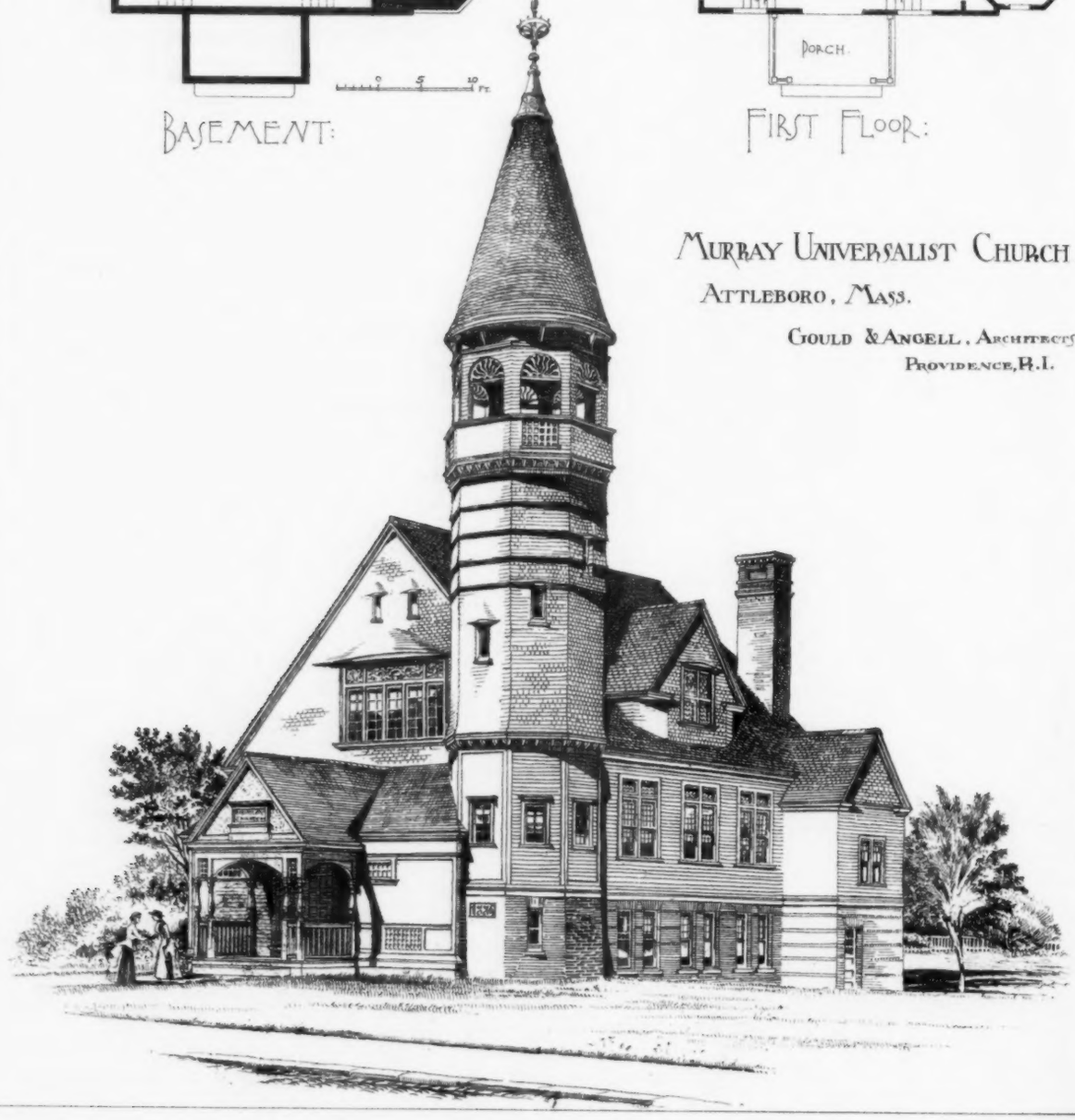


Murray Universalist Church.

Attleboro, Mass.

Gould & Angell, Architects.
Providence, R.I.



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Palacio del Infantado, Guadalajara Spain.
Main Entrance.

Palacio del Infantado, Guadalajara Spain.

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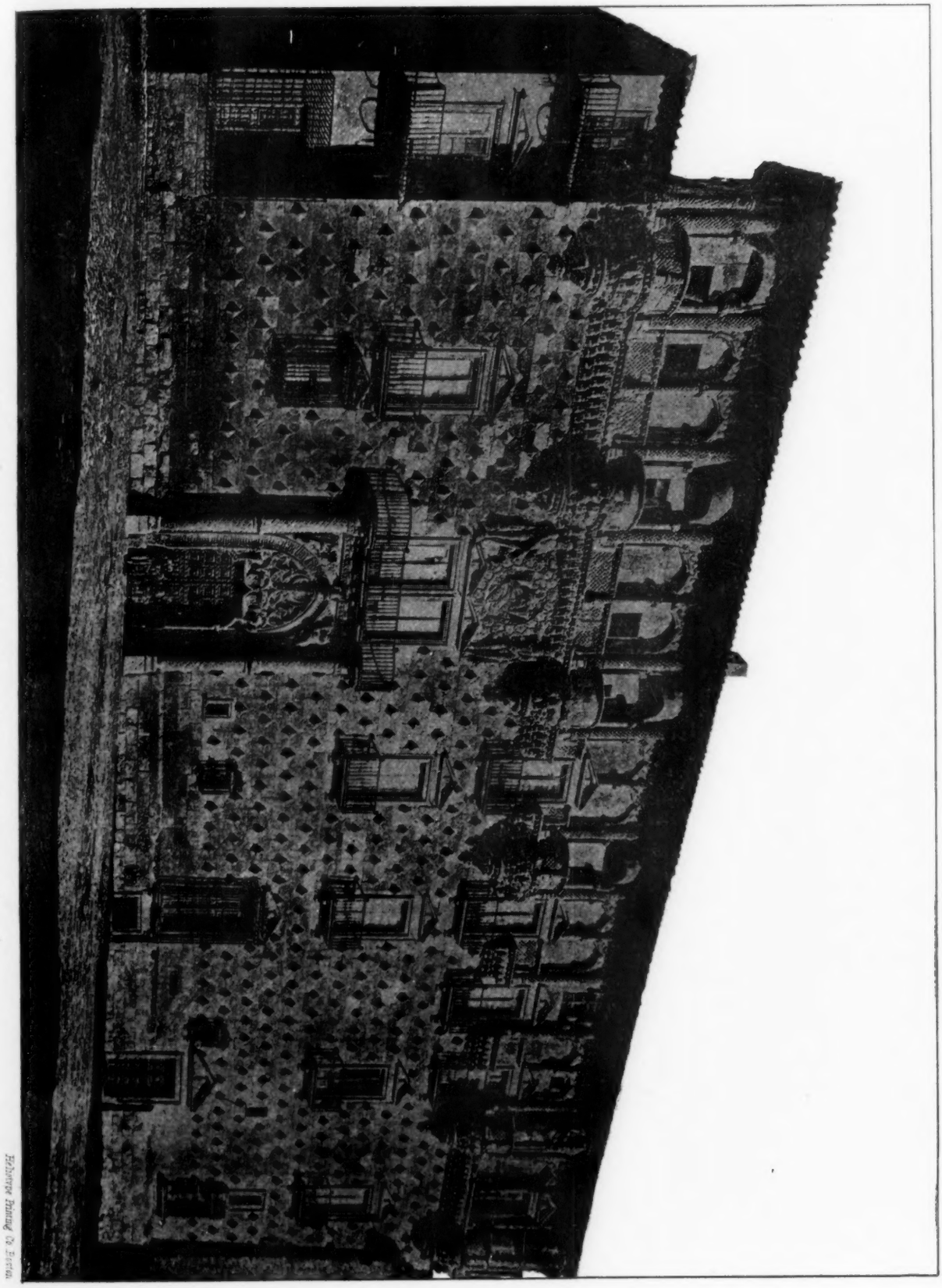

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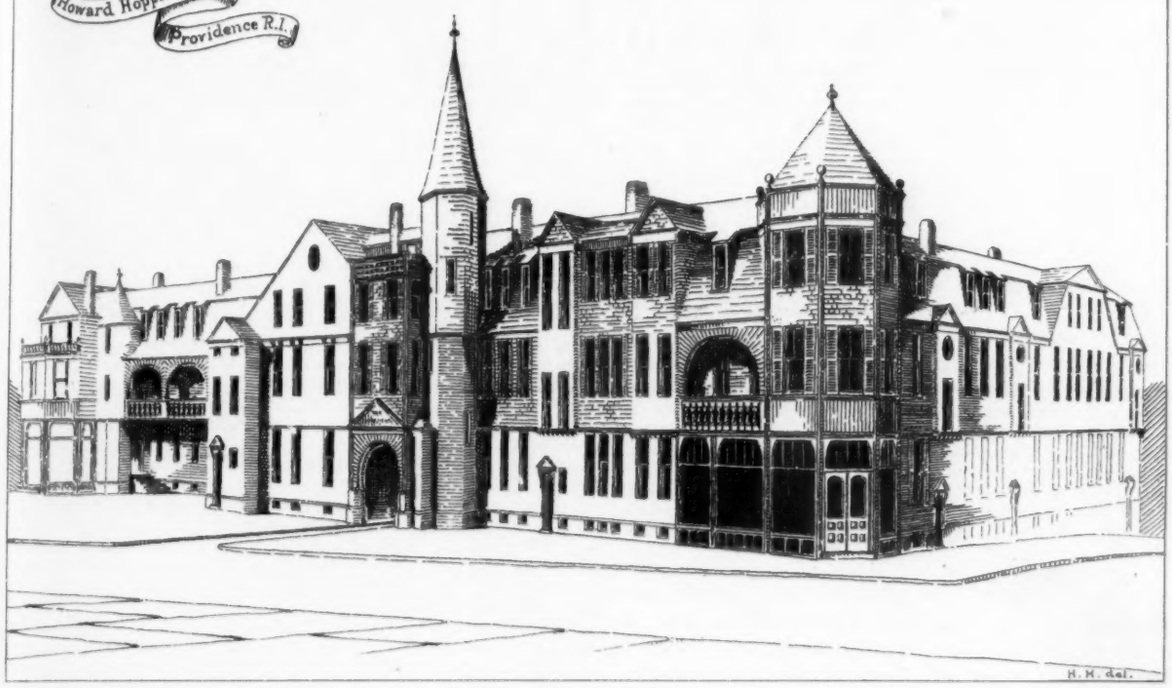
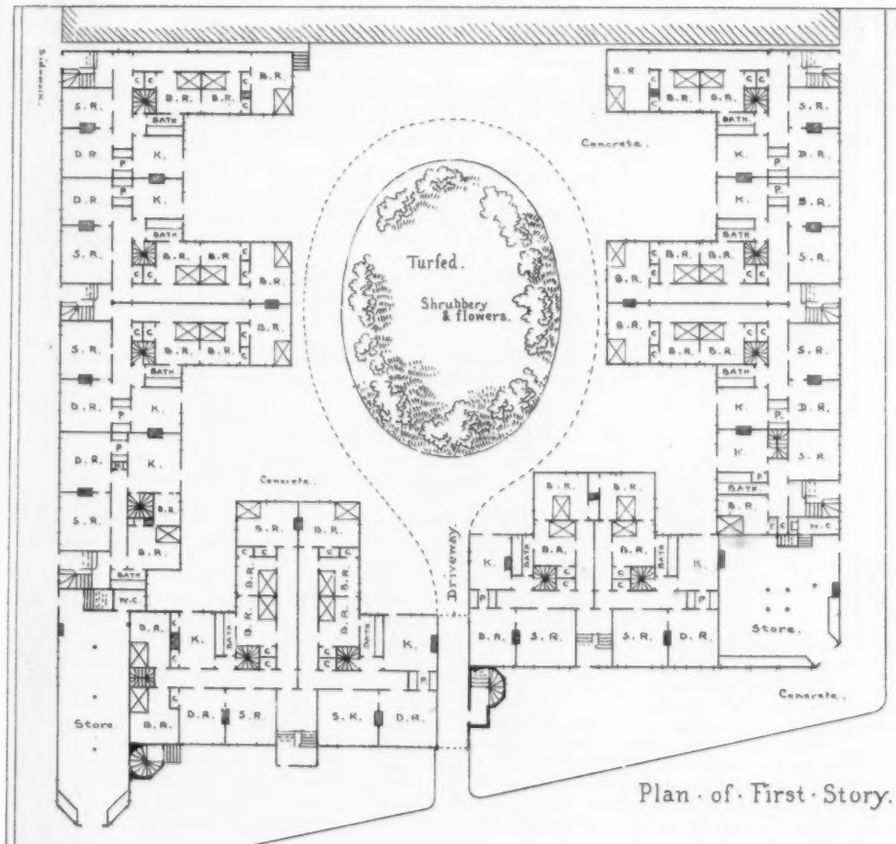
BLOCK·OF·APARTMENT·HOUSES
for The Central Land Co., Providence R.I.

THE "WHITFIELD."

Howard Hoppin Arch't. Providence R.I.



H. H. del.



Plan · of · First · Story.

BLOCK OF APARTMENT HOUSES for THE CENTRAL LAND CO. Providence R.I.

Howard Hoppin Arch't.
Prov. R.I.

S. J. McE. del.

Heliotype Printing Co. Bost.n.

Mr. Henry Lord Gay presented a petition from the "Technical Associated Press," asking the Association to do away with the system of "official organ" reports. A motion made by Mr. E. H. Ketcham to lay the petition on the table indefinitely, was almost unanimously defeated. Mr. Sidney Smith moved that the petition be received and freely discussed, which was carried. Mr. S. M. Randolph moved that the resolution appointing the *Inland Architect* the official organ be reconsidered, and it was carried. The question was discussed by C. E. Illsley, of St. Louis, who moved that the petition be referred to a committee. This was not seconded, and other remarks were made by Messrs. D. Adler, F. G. Corser, and C. C. Hellmers, the latter of whom moved that the committee be instructed to find the cost of publishing the proceedings in pamphlet form, and Messrs. Jno. W. Root, E. F. Fassett, Henry Lord Gay, Charles W. Crapsey, and B. P. Furber were appointed. Mr. Illsley's motion was then put and defeated.

Mr. Geo. W. Rapp, of Cincinnati, moved that the Association receive bids from two prominent Western journals for the privilege of publishing the reports.

Mr. S. A. Bullard, of Springfield, Ill., moved as a substitute that the proceedings be published in pamphlet form, and it prevailed. It was voted that at future conventions the Board of Directors be authorized to employ a stenographer to take down the proceedings.

On motion of Mr. Hellmers, it was voted that the names of applicants be sent to the Board of Directors, and their names be forwarded to each member thirty days before each convention.

Mr. Adler retired from the chair, and offered a motion that members of local architectural associations in States where no State association is organized, be admitted without dues; but it was referred to the Board of Directors for action.

Mr. C. E. Illsley presented a paper on "Sewer-Gas," and, on his own motion, it was not read, but ordered printed in the *Proceedings*.

The President read the reports of the two nominating committees. One committee reported: For place of next annual meeting, Chicago; for President, Sidney Smith, of Omaha; for Secretary, John W. Root, of Chicago; for Treasurer, Geo. W. Rapp, of Cincinnati; for Board of Directors, D. H. Burnham, Chairman, Chicago; Wm. Holabird, Chicago; C. L. Stiles, Chicago; G. M. Goodwin, Minneapolis; C. C. Hellmers, Jr., St. Louis.

The other committee reported: For place of next annual meeting, Cincinnati; for President, John W. Root, of Chicago; for Secretary, J. F. Alexander, La Fayette, Ind.; for Treasurer, S. A. Treat, Chicago; for Board of Directors, Geo. W. Rapp, Cincinnati; Chas. Crapsey, Cincinnati; G. M. Goodwin, St. Paul; D. Adler, Chicago; C. C. Hellmers, Jr., St. Louis.

Mr. Sidney Smith declined the honor of office, and moved that Mr. John W. Root be elected unanimously. He was so elected, (Cheers.)

The ballot for location resulted as follows: Cincinnati, 56; Chicago, 31; St. Paul, 4.

The ballot for Secretary resulted as follows: J. F. Alexander, 39; L. H. Sullivan, 35; and a few scattering.

Mr. Treat was then elected Treasurer.

The ballot for Board of Directors resulted in the election of the following gentlemen: George W. Rapp, Cincinnati; Charles Crapsey, Cincinnati; D. Adler, Chicago; G. M. Goodwin, Minneapolis; C. A. Curten, Louisville, Ky.

Messrs. W. W. Carlin, of Buffalo, and George W. Thompson, of Nashville, Tenn., were elected members.

Thanks were extended to the "*Technical Associated Press*" for daily reports furnished, and to the Illinois State Association of Architects for entertainment.

The Chairman, Mr. Adler, announced the following standing committees (as far as appointed) for 1887:—

Committee on Discipline: The Board of Directors of the Western Association.

Committee on Raising the Standard of Professional Requirements for Membership: L. H. Sullivan, Chicago; Isaac Hodgson, St. Louis; Geo. B. Ferry, Milwaukee.

Committee on the Adoption of the Metrical System: N. S. Patton, Chicago; T. B. Annan, St. Louis; Geo. B. Ferry, Milwaukee.

Committee on Uniform Contracts and Specifications: The Executive Boards of the Several State Associations, to report at the next session of the Western Association.

Committee to take charge of the Bill Governing the Office of Supervising Architect of the United States: D. Adler, Chicago; D. H. Burnham, Chicago; J. F. Alexander, La Fayette, Ind.

Committee on Procuring Architectural Drawings and Photographs for Exhibition at the next Convention of the Western Association: The members of the Committee on Formation of State Associations.

Committee on Collection of Statistics on Competitions: C. E. Illsley, St. Louis, Mo.; Sidney Smith, Omaha, Neb.; E. H. Taylor, Des Moines, Io.; G. W. Rapp, Cincinnati, O.; J. F. Alexander, La Fayette, Ind.

Committee to Represent the Western Association at the next Annual Convention of the American Institute: W. L. B. Jenney, Chicago, Ill.; J. F. Alexander, La Fayette, Ind.; Sidney Smith, Omaha, Neb.; J. G. Haskell, Topeka, Kans.; John W. Root, Chicago.

After inviting the members to another lunch at Kingsley's, on behalf of the Illinois State Architects' Association, the meeting was adjourned *sine die*.

THE ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE ON DUDLEY STREET, ROXBURY, MASS.

[Gelatine Print issued only with the Imperial Edition.]

UNTIL within a very few years, this was one of the best preserved of the old houses of the first class that could be found in the neighborhood of Boston. It is now generally known as the Taylor house, and is still owned by the heirs of that family. It is said to have been built about 1790 by one of the Coolidges, but which member of the family it was we have been unable to ascertain. More than any house we know, hereabouts, this one has an air of dignity and open-handed hospitality that one is more apt to associate with Virginians than with the followers of the Puritans. The house still stands isolated in its own grounds, wherein can be traced the remains of the old-fashioned formal garden, with its snug border of box, and fantastically trimmed shrubs. At the right can be seen the barn, which is as typical as the house, and one end of the long row of carriage-houses and other dependencies, backing against which are spacious graperies.

THE WESTFIELD APARTMENT-HOUSES, PROVIDENCE, R. I. MR. HOWARD HOPPIN, ARCHITECT, PROVIDENCE, R. I.

THIS building comprises thirty-nine distinct apartments and two stores. Every apartment has a private front door from private front hall to staircase hall. Every apartment has range and boiler, sink, bath-tub and water-closet; hot and cold water in all kitchens and bath-rooms. Every sitting-room and every dining-room is on a street front. Every apartment has a separate cellar with window on a street front for coal, etc. All staircase halls, sitting-rooms, dining-rooms and bed-rooms are papered. All other walls have soapstone finish. The whole building, outside, is shingled above string-course over first-story windows. Clapboarded below. Shingles stained red. Clapboards and trimmings painted gray-green.

MANTELS IN THE OFFICE OF LAMB & RICH, ARCHITECTS, NEW YORK, N. Y., AND AT WAITT PLACE, BARNSTABLE, MASS. MEASURED AND DRAWN BY MR. F. E. WALLIS, BOSTON, MASS.

MURRAY UNIVERSALIST CHURCH, ATTLEBORO', MASS. MESSRS. GOULD & ANGELL, ARCHITECTS, PROVIDENCE, R. I.

COTTAGE FOR G. C. HAMMILL, ESQ., SARATOGA, N. Y. MR. H. LANGFORD WARREN, ARCHITECT, BOSTON, MASS.

PALACIO DEL INFANTADO, GUADALAJARA, SPAIN.

MAIN ENTRANCE OF THE SAME.

SAFE BUILDING.[1]—X.

THE ARCH.

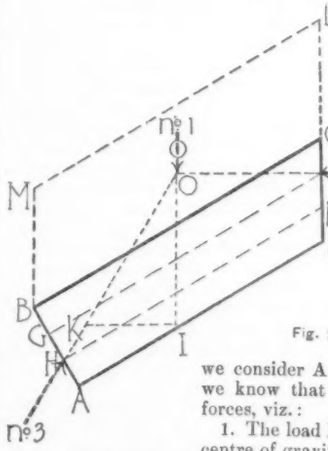


Fig. 29.

WE consider an arch as a truss with a succession of straight pieces; we can calculate it graphically the same as any other truss, only we will find that the absence of central or inner members (struts and ties) will force the line of pressure, as a rule, far away from the central axis. Thus, if in Fig. 29, we consider A B C D as a loaded half-arch, we know that it is held in place by three forces, viz.:

1. The load B C L M which acts through its centre of gravity as indicated by arrow No. 1.

2. A horizontal force No. 2 at the crown C D, which keeps the arch from spreading to the right.

3. A force at the base B A (indicated by the arrow No. 3), which keeps the arch from spreading at the base. Now we know the direction and amount of No. 1, and can easily find Nos. 2 and 3. In an arch lightly loaded, No. 2 is always assumed to act at two-thirds way down C D, that is at F (where C E = E F = F D = $\frac{1}{3}$ C D). In an arch heavily loaded, No. 2 is always assumed to act one-third way down C D, that is at E; further the force No. 3 is always assumed to act through a point two-thirds way down B A, that is at H (where B G = G H = H A = $\frac{1}{3}$ B A). The reason for these assumptions

[1] Continued from page 220, No. 567.

need not be gone into here. Therefore to find forces Nos. 2 and 3 proceed as follows: If the arch is heavily loaded, draw No. 2 horizontally through E (C E being equal to $\frac{1}{3}$ C D), prolong No 2 till it intersects No. 1 at O, then draw O H (H A being equal to $\frac{1}{3}$ B A), which gives the direction of the resistance No. 3. We now have the three forces acting on the arch concentrated at the point O, and can easily find the amounts of each by using the parallelogram of forces. Make O I vertical and (at any scale) equal to whole load (or No. 1), draw I K horizontally, till it intersects O H at K; then scale I K, and K O (at same scale as O I), which will give the amount of the forces Nos. 2 and 3. The line of pressure of this arch A B C D, is therefore not through the central axis, but along E O H (a curve drawn through E and H with the lines Nos. 2 and 3 as tangents is the real line of pressure.

Line of pressure not central.

Now let in Fig. 30, A B C E F D A represent a half-arch. We can examine A B C D same as before, and obtain I K = to force

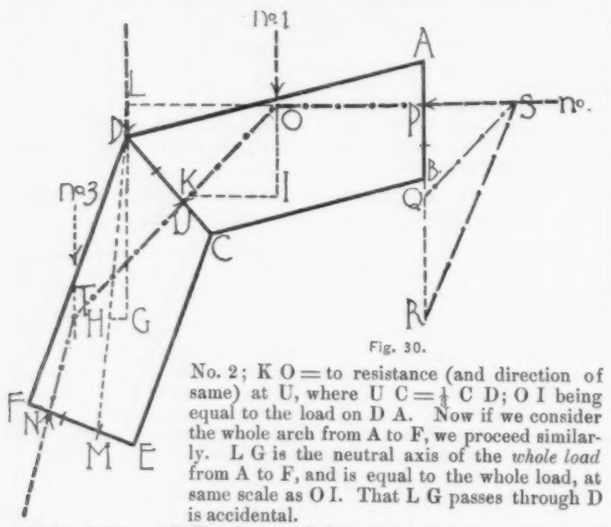


Fig. 30.

No. 2; K O = to resistance (and direction of same) at U, where U C = $\frac{1}{3}$ C D; O I being equal to the load on D A. Now if we consider the whole arch from A to F, we proceed similarly. L G is the neutral axis of the *whole load* from A to F, and is equal to the whole load, at same scale as O I. That L G passes through D is accidental.

Make E M = $\frac{1}{3}$ E F and draw L M; also G H horizontally till it intersects L M at H, then is G H the horizontal force or No. 2. We now have two different quantities for force No. 2, viz.: I K and G H, I K in this case being the larger. It is evident that if the whole half-arch is one homogeneous mass, that the greatest horizontal thrust of any one part, will be the horizontal thrust of the whole, we select therefore the larger force or I K as the amount of the horizontal thrust.

Now make S P = to I K and P Q = to No. 1, or load on A D and P R = to L G or whole load on F A, at any scale, then draw Q S and R S. Now at O we have the three forces concentrated, which act on the part of arch A B C D, viz.: Load No. 1 (= P Q), horizontal force No 2 (= S P) and resistance K O (= Q S). Now let No. 3 represent the vertical neutral axis of the part of whole load on F D, then prolong K O until it intersects No. 3 at T; then at T we have the three forces acting on the part of arch E C D F, viz.: The load No. 5 (= Q R), the thrust from A B C D, viz.: O T (= S Q), and the resistance N T (= R S). To obtain N T draw through T a line parallel to R S, of course R S giving not only the direction, but also the amount of the resistance N T. The line of pressure of this arch therefore passes along P O, O T, T N. A curve drawn through points P, U and N—(that is, where the former lines intersect the joints A B, D C, F E)—and with lines P O, O T and T N as tangents is the real line of pressure. Of course the more parts we divide the arch into, the more points and tangents will we have, and the nearer will our line of pressure approach the real curve.

Now if this line of pressure would always pass through the exact centre or axis of the arch, the compression on each joint would of course be uniformly spread over the whole joint, and the amount of this compression on each square-inch of the joint would be equal to the amount of (line of) pressure at said joint, divided by the area of the cross-section of the arch in square inches, but this rarely occurs, and as the position of the line of pressure varies from the central axis so will the strains on the cross section var y also.

Stress at Intrados and extrados.

Let the line A B in all the following figures represent the section of any joint of an arch (the thickness of arch being overlooked) C D the amount and actual position of line of pressure at said joint and the small arrows the stress or resistance of arch at the joint.

We see then that when C D is in the centre of A B, Fig. 31, the stress is uniform, that is the joint is, uniformly compressed, the amount of compression being equal to the average as above. As the line of pressure C D approaches one side, Fig. 32, the amount of compression on that side increases, while on the further side it decreases, until the line of pressure C D, reaches one-third way, Fig. 33 (that is, D B = $\frac{1}{3}$ A B). Then we see there is no compression at A, but at B the compression is equal to just double the average as it was in Fig. 31. Now, as C D passes beyond the central third of A B, Fig. 34, the compression at the nearer side increases still further, while the further side begins to be subjected to stress in the opposite direction or tension, this action increasing of course the further C D is moved from the central third. This means that the edge of arch section at B would be subject to very severe crushing, while the other edge (at A) would tend to separate or open. When the line C D passes on to the edge B, the nearer two-thirds of arch joint will be in compression, and the further third in tension. As the line passes out of joint, and further and further away from B, less and less of the joint is in compression, while more and more is in tension, until the line of pressure C D gets so far away from the joint finally, that one-half of the joint would be in tension, and the other half in compression.

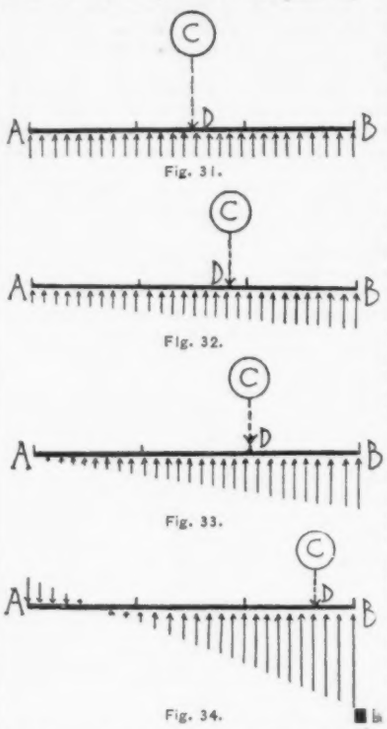


Fig. 31.

Fig. 32.

Fig. 33.

Fig. 34.

Tension means that the joint is tending to open upwards, and as arches are manifestly more fit to resist crushing of the joints than opening, it becomes apparent why it is dangerous to have the line of pressure far from the central axis. Still, too severe crushing strains must be avoided also, and hence the desirability of trying to get the line of pressure into the inner third of arch ring, if possible.

But the fact of the line of pressure coming outside of the inner third of arch ring, or even entirely outside of the arch, does not necessarily mean that the arch is unstable; in these cases, however, we must calculate the exact strains on the extreme fibres of the joint at both the inner and outer edges of the arch (intrados and extrados), and see to it that these strains do not exceed the *safe* stress for the material.

The formulæ to be used, are:

For the edge fibres nearest to the line of pressure

$$V = \frac{x}{a} + 6.\frac{x.p}{a.d} \qquad (44)$$

And for the edge fibres furthest from the line of pressure

$$V = \frac{x}{a} - 6.\frac{x.p}{a.d} \qquad (45)$$

Where v = the stress in lbs., required to be exerted by the extreme edge fibres (at intrados and extrados).

Where x = the distance of line of pressure from centre of joint in inches.

Glossary of Symbols.—The following letters, *in all cases*, will be found to express the same meaning, *unless distinctly otherwise stated*, viz.:—

a = *area*, in square inches.
b = *breadth*, in inches.
c = constant for *ultimate resistance to compression*, in pounds, per square inch.
d = *depth*, in inches.
e = constant for *modulus of elasticity*, in pounds-inch, that is, pounds per square inch.
f = *factor-of-safety*.
g = constant for *ultimate resistance to shearing*, per square inch, across the grain.
g_1 = constant for *ultimate resistance to shearing*, per square inch, lengthwise of the grain.
h = *height*, in inches.
i = *moment of inertia*, in inches. [See Table I.]
k = *ultimate modulus of rupture*, in pounds, per square inch.
l = *length*, in inches.
m = *moment or bending moment*, in pounds-inch.
n = *constant* in Rankine's formula for compression of long pillars. [See Table I.]
o = the *centre*.
p = the *amount* of the *left-hand re-action* (or support) of beams, in pounds.
q = the *amount* of the *right-hand re-action* (or support) of beams, in pounds.
r = *moment of resistance*, in inches. [See Table I.]
s = *strain*, in pounds.
t = constant for *ultimate resistance to tension*, in pounds, per square inch.
u = *uniform load*, in pounds.
v = *stress*, in pounds.
w = *load at centre*, in pounds.
x, y and z signify *unknown quantities*, either in pounds or inches.
δ = *total deflection*, in inches.
ρ^2 = *square of the radius of gyration*, in inches. [See Table I.]
$\mathfrak{D}$ = *diameter*, in inches.
$\mathfrak{r}$ = *radius*, in inches.
π = 3.14159, or, say, 3.1-7 signifies the *ratio of the circumference and diameter of a circle*.

If there are more than one of each kind, the second, third, etc., are indicated with the Roman numerals, as, for instance, a, a_{II}, a_{III}, etc., or b, b_{I}, b_{II}, b_{III}, etc.

In taking moments, or bending moments, strains, stresses, etc., to signify at what point they are taken, the letter signifying that point is added, as, for instance:—

m = moment or bending moment at *centre*.
m_A = " " " *point A*.
m_B = " " " *point B*.
m_X = " " " *point X*.
s = strain at *centre*.
s_B = " *point B*.
s_X = " *point X*.
v = stress at *centre*.
v_D = " *point D*.
v_X = " *point X*.
w = load at *centre*.
w_A = " *point A*.

Where $a =$ the area of cross section of arch at the joint, in square inches.

Where $p =$ the total amount of pressure at the joint in lbs.

Where $d =$ the depth of arch ring at the joint in inches, measured from intrados to extrados.

When the result of the formulæ (44) and (45) is a positive quantity the stress v should not exceed $\left(\frac{c}{f}\right)$, that is the safe compressive stress of the material. When, however, the result of the formula (45) yields a negative quantity, the stress v should not exceed $\left(\frac{t}{f}\right)$, that is the safe tensile stress of the material, or mortar.

The whole subject of arches will be treated much more fully later on in the chapter on arches.

LOUIS DECOPPET BERG.

[To be continued.]

THE SEPARATE SYSTEM OF SEWERAGE.[1]

TWO engineers, not long ago, had occasion to design and construct a system of sewerage for an important Eastern town. Like conscientious men, they studied the case thoroughly before laying out their plan, collecting and comparing all the information within their reach, and, as the result of their observations, devised a system of separate sewerage, which they carried into successful execution, and, as a supplement to their work, they formed the excellent idea of publishing an abridgement of the notes which they had gathered from a multitude of sources, for the benefit of other engineers and of the public. This task they did well, and their little book is not more remarkable for its fairness and moderation of statement in regard to points disputed in the profession than for its practical character, every detail of the most improved separate-sewer construction being described with a clearness and precision which particularly commend the work to general readers, and to non-professional persons, such as town and city authorities, who are obliged to decide upon many of the points considered, and who wish to be able to do so intelligently. The book begins with a succinct presentation of the well-known facts on which the necessity for sewers is based, fortifying its statements of the dangers of cesspool disposal of wastes by a number of new analyses of well-water, some of which are very striking. The analyses differ somewhat from those usually given, the combined ammonium appearing as organic nitrogen, and nitrites being reduced and added to the nitrates, while the proportion of chlorine, which is now known, in inland towns, to furnish the surest evidence of sewerage pollution, is given in a column next to the nitrate figures. According to the table, Schenectady, New York, appears to boast some of the worst well-water in the world. One sample, taken on the thirtieth of March, at the time when the ground is usually most thoroughly saturated with water, and impurities in wells are, therefore, most diluted, showed not only free and combined ammonia in extraordinary quantities, but more than three parts in one hundred thousand of nitrates, and nearly twenty-eight and one-half parts of chlorine. This specimen was taken from the water furnished to a typhoid-fever patient, who claimed that it was "the best water in the city." Another sample, nearly as rich as the last, was also taken by a physician from a well out of which had drunk three persons, all of whom had had severe illnesses, from which two had died; and it is remarkable that, after the physician in question had stopped the use of the well-water by a fourth patient whom he found very ill in the same house, she began immediately to improve, and from a condition of high fever, with pulse at 140, and temperature 105.5, accompanied by nausea and diarrhœa, she regained in two weeks nearly her usual health. It seems strange that intelligent persons should need books to warn them of the danger of drinking water from wells situated near privy vaults or cesspools, as were, of course, those from which all these highly-chlorinated samples were taken, yet the situation of the worst of the wells described was not so objectionable as that of one from which we were once urged, in vain, to drink some particularly delicious water, and there can be little doubt that the opinion of the most experienced health officers, that the majority of all the wells in use furnish water contaminated with ordure, is correct.

To the ordinary reader the connection between the condemnation of unwholesome wells and the introduction of sewers does not seem so close as it does to the engineer. It seems easy enough, if a well is shown to be impure, to dig another on higher ground, or at a safe distance; but sanitarians have long ago found out that, inasmuch as wells within a moderate distance of each other take their supply from the same slowly circulating stratum of ground water, any pollution detected in one is quite sure to be sooner or later shared by the others, while, in point of fact, nothing short of a severe surveillance could prevent people from drinking out of the polluted wells, in spite of the danger, if it happened to be a little cheaper or less troublesome to get their supply from them than from some better source. Some persons, not acquainted with such matters, may resent this statement as casting an unmerited imputation on the popular common sense, but the fact that it was seriously proposed, not long ago, to supply the tenants in the Western Union Telegraph building on Broadway, in New York, with drinking water from an artesian well sunk in the cellar of the building, in a loose, gravelly soil, which in that region is so honeycombed with old cesspools that we have ourselves known more than fifty to be exposed in excavating for a cellar about one hundred and fifty feet square, is evidence enough that people of considerable intelligence are not always on their guard against evils, which, if they thought about them, they would regard with sufficient apprehension; and the only safe course is, as long experience has proved, to separate, totally and permanently, the water which comes into a house from that which runs out of it. Whether this is best done by mixing the house-wastes with the rain-water which falls on the roofs, pavements, streets and lawns, and letting the whole flow away together, or by keeping the house-wastes separate, in small pipes, and providing for its safe removal independent of that of rain-water, is a question of detail in sewerage, but this detail is now becoming the most important one connected with the subject, except, perhaps, that of the final disposition of the waste material.

It is hardly necessary to say that our authors, like all who approach the subject of drainage from its sanitary side, favor very strongly the removal of the house-wastes by themselves, in small glazed pipes, so arranged as to secure the rapid transfer of all refuse liquids, before they have time to putrefy, to a place of safety, leaving storm-waters to be carried away to the rivers or elsewhere, either by paved or grassed gutters, or, in the case of densely-populated cities, by a system of pipes appropriated to that object, and serving also, perhaps, to drain the subsoil by some provision for admitting ground-water. The objection usually urged against the separate system of sewerage is the increased expense, the argument being that as ordinary sewers, to carry off the water of even a moderate rainfall, must be made so large that the addition of house-wastes does not necessitate any increase in the size of the pipes, the construction of a separate system of pipe for conveying house-wastes alone is a work of supererogation, to use the only English word which expresses the necessary idea; and the cost of the system of small pipes, in a growing town, had better be saved to go towards paying for the larger pipes which will some time be necessary, and will accommodate all the sewage as well as the storm-water. There is good sense in this reasoning, so much, in fact, that thousands of lives are probably sacrificed every year to vindicate it, and in the discussion of the problem of sewerage, which is already a very pressing one for scores of small towns and cities, it should be fairly faced. If our streets were kept like these of a French town, it would be easy to say that the question was not between street-drains with or without provision for carrying sewage, but between the small-pipe sewerage system and that of cesspools and privies, and we should look with horror on the idea of admitting sewage to the clear streams of surface-water which we conducted, after storms, into the natural water-courses; but with our streets as they now are, the washings from the most frequented of them are as foul as any sewage, and could not be allowed to flow in open channels without annoyance, and perhaps danger; so that we are brought back to the premises from which we started, that, as we shall have dirty water flowing through our street-drains in any case, when we get them, and as the addition of two per cent in the form of house-wastes will not require any increase in the size of the drains, it is wasteful to spend the money which might be saved for street-drains in laying small pipes to carry house-wastes alone; and these considerations appear to many town governments unanswerable.

It is quite time that, in the interest of the public health, the reply to this reasoning should be generally known. The question for most of our small cities is not whether present expenditure shall be avoided to save money for future possible needs, but whether the system now in use may not at once be advantageously replaced by another, leaving this to be replaced by a third, ten, twenty, or fifty years hence, if it shall then be necessary to make the change. As between the advantage of a system of small-pipe sewers, with the safe, quick and cheap removal of refuse liquid, and those of a system of cesspools and privies, costly to clean, dangerous to those who own them, as well as to their neighbors, and slowly, but surely destructive, by the incurable pollution of the ground, of the healthfulness and good name of the community in which they are allowed to exist, there can be no difference of opinion; and it ought to be clearly understood that from the moment when the money value of the lives annually lost in any town by preventable zymotic diseases, added to the expense of cleaning cesspools and privies, and the interest on their cost, reaches the amount of the annual interest on the cost of a sewerage system for removing the wastes which the cesspools and privies have been receiving, any delay in providing such a sewerage system is not an economy, but a direct loss in money to the community, which increases at compound interest from year to year. According to Messrs. Staley and Pierson's tables, the expense of a complete set of sewers for house-wastes only, as shown by the experience of Memphis, Keene, and other places, varies from seventy-two cents per lineal foot, which was the cost at Schenectady,

[1] "*The Separate System of Sewerage.*" Its Theory and Construction. By Cady Staley, President of the School of Applied Science, Cleveland, Ohio, and Geo. S. Pierson, C. E. New York: D. Van Nostrand, 23 Murray Street. 1886.

to one dollar and forty-six cents per foot at Memphis, which, however, included the expense of subsoil-drains laid in the same trench; and the cost of maintenance is about one-fourth of one per cent on the cost per annum. To apply this roughly to the conditions which exist in hundreds of towns, we will suppose that the inhabitants of the more thickly-settled part of a small city are considering the subject of putting in sewers for themselves, at their own expense. There are about four miles of streets in the portion which it is proposed to provide with sewers, or nearly twenty thousand feet, and the house-lots fronting on them average, including the allowance for the vacant lots, two hundred feet in width. This will give two hundred houses, counting both sides of the streets, each with a privy and a cesspool. Supposing that it is necessary to go two miles beyond the most remote end of the sewered district to get a proper outfall for the sewers, we shall have approximately thirty thousand feet of sewer, which, at a dollar a foot, will cost thirty thousand dollars, and will need an outlay of one hundred and fifty dollars a year for maintenance, which we will call the interest on thirty-seven hundred and fifty dollars, and add this, as capital, to the cost of the sewers, making the whole capitalization thirty-three thousand seven hundred and fifty dollars. On the other side of the balance sheet we find the cost of two hundred cesspools and an equal number of privy vaults, which may be set down at seventy-five dollars for each house, or fifteen thousand dollars in all. The annual cost of cleaning each cesspool, including a sinking-fund for renewal when it becomes hopelessly clogged, would not be less, taking the average of our well-to-do cities, than twelve dollars, and the annual cleaning of a privy costs about five dollars more. This gives us, for maintenance of cesspool and privy, seventeen dollars a year for each house, or thirty-four hundred dollars in all, which, capitalized as before at four per cent, gives eighty-five thousand dollars. Adding this to the original outlay for the cesspools and privies, we find the total capitalization of the filthy old system, or the actual cost, reduced to one payment, to be exactly one hundred thousand dollars, leaving a profit to be added to the sewerage side of the balance sheet of sixty-six thousand two hundred and fifty dollars. We might well open another account with indirect expenses incident to the old system, to include income lost through attacks of diphtheria, pneumonia, sore throat, typhoid fever, consumptive ailments, colds, agues, diarrhœas, dysenteries, rheumatism and general debility, directly occasioned by foul air and saturation of the soil, together with the cost of medical attendance and funerals, but this, although a calculable and very large quantity, need not here be considered, the other figures being sufficient to show the financial folly, even in a community of immortal beings, exempt from aches and pains, of delaying for a moment, under the conditions which obtain in the more closely settled part of most towns of ten thousand inhabitants, the substitution of small-pipe sewers for the barbarous, filthy and extravagantly costly devices which, in practice, deplete our pockets while they fill our homes with sickness and mourning.

RUSSIAN RULES FOR THE USE OF STEEL IN CONSTRUCTION.

AT ASHCHURCH JUNCTION, FRANCE

AFTER SKETCH BY HERON

THE Russian Ministry of Roads has published a series of provisional regulations concerning the use of steel, of which the following is a summary:

1. Steel, whether Bessemer or Siemens-Martin, may be used in all structures.

2. In view of the great sensitiveness of steel to mechanical working, it is to be noted that —

(*a.*) Plates and other sections must be tempered, after rolling, by means of the sand-bath. Care must be taken that on leaving the rolls the metal is not below a cherry-red heat.

(*b.*) Holes must not be punched, but drilled.

(*c.*) When worked cold, the material must not be sheared, but cut with a chisel. The edges must be planed. All boring must be done hot, and provision be made for subsequent slow cooling.

3. The material must possess the following properties:

(*a.*) It must contain from 0.05 to 0.20 per cent of carbon.

(*b.*) Except for rivets, the tensile strength of all kinds of steel must be from 25.4 to 29.8 tons per square inch, extension at least 18 per cent, and the contraction of area at least 36 per cent.

For rivets, the tensile strength must be from 22.2 to 25.4 tons per square inch, extension at least 20 per cent, and contraction of area at least 50 per cent. The percentage of carbon for rivets must approach the lower limit (see *a*). Extension and contraction of area are to be measured on test pieces of 10 inches in length. The test pieces must be worked cold.

4. A strip of the metal 10 or 12 inches in length, heated to cherry-red, and then plunged into water at 85½ degrees Fahrenheit, must not show any cracks when so bent that the inner faces of the bent piece, at a distance from the angle of one-and-a-half times the thickness of the plate, are three times the thickness of the plate apart.

5. The permissible strain upon the material is as follows:

(*a.*) For bridges of less than 49-foot span, and also for roadway-bearers (longitudinal and cross):

	Tons per square inch. Steel.	Iron.
For tension and compression,	4.4	3.8
Shearing of rivets, fastening the longitudinal to the cross-bearers, and these to the main girders,	3.8	3.2
Shearing of rivets in the rest of the structure,	4.4	3.8
Shearing of the web of a plate-girder,	2.9	2.2
(*b.*) For main girders of bridges of from 49 to 95 foot span:		
Compression (after deducting half area of rivet holes),	4.8	4.4
For tension (net cross-section, after deducting rivet-holes),	4.8	4.4
Shearing of rivets,	4.4	3.8
(*c.*) For main girders of bridges of more than 95-foot span:		
Tension (net cross-section, after deducting rivet-holes),	5.1	4.6
Compression (after deducting half area of rivet-holes),	5.1	4.6
Shearing of rivets,	4.4	3.8
(*d.*) For wind-bracing of bridges of more than 95-foot span:		
Tension (net cross-section),	6.3	5.7
Compression (after deducting half area of rivet-holes),	5.7	5.7
Shearing of rivets,	5.1	4.8

Iron and steel may be used in the same structure, but with the limitation that in each member of a group of similar parts the same material is to be used. For instance, the top and bottom booms of a girder form such a group; the diagonals and verticals of a girder, the cross and longitudinal roadway-bearers, are other such groups. The use of steel rivets is not compulsory with steel plates. — *Iron.*

SOCIETIES

BUFFALO ARCHITECTURAL SKETCH CLUB.

THE Buffalo Architectural Sketch Club was organized last week at the office of W. W. Carlin, 57 Chapin Block, with twenty-five members. Meetings will be held on the second and fourth Wednesdays of every month. The following officers were elected: President, F. R. Fuller; first vice-president, F. C. Townsend; second vice-president, William Lansing; secretary, J. S. Rowe; treasurer, F. W. Fisher. J. S. Rowe, *Secretary.*

COMMUNICATIONS

STEEL PLATES AND THE OREGON.

Providence, R. I., November 22, 1886.

To the Editors of the American Architect: —

Dear Sirs, — In your No. 534, of March 20, 1886, you suggested that the loss of the "*Oregon*" might be attributed to her having been built of mild steel, when some of its characteristic qualities were less well known than at present. You refer again to the "*Oregon*" in No. 569, of last Saturday, in an article on the different steels and iron, and I suppose classing her as of steel.

I thought your theory a most excellent one, until I chanced to see, in a "*History of the Cunard Steamship Company,*" issued by that company, that the "*Oregon*" was described as an "*iron* screw steamship," the only steel ships of that company being the four at present running to New York. Very truly, B.

[The "*Oregon*" is described, we believe, in "*Lloyd's Register,*" as well as in the "*History of the Cunard Steamship Company,*" as being of iron, but at the time of the accident to it the plates were many times spoken of as being of steel, and we have never seen any authoritative denial of this. — Eds. American Architect.]

AN UNHAPPY — YET HAPPY — BLUNDER.

Royal Institute of British Architects,
9 Conduit St., Hanover Square,
London, W., November 12, 1886.

To the Editors of the American Architect: —

Dear Sirs, — In your issue of the 30th ult., you announce the death of Mr. George Godwin, F. R. S. Permit me to inform you and your readers that, happily, we have not to deplore this gentleman's decease. Your informant has evidently confused the two architects, George Godwin and the late E. W. Godwin. Mr. George Godwin, although he has had but indifferent health for many years, is still active in his work for others; and so late as Wednesday last was engaged, with his accustomed mental vigor, at a meeting of the Royal Literary Fund, with which society, among various others, he has been connected for many years. I have the honor to be, sir,

Yours, etc., Heron B. Verity.

MILL-FLOORS IN BOSTON.

BOSTON, MASS., November 23, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Does not Mr. Atkinson prove by his own figures that the average safe load per square foot, sustained by regular mill construction of the three floors he has assumed would be about twenty-five per cent less than by the system using longitudinal girders? Also that the latter system saves about six per cent in weight of floor, while gaining the twenty-five per cent in strength? Leaving out the question of increased combustibility, it would seem that a total gain of over twenty-five per cent in strength of a floor was a very substantial reason for employment of system he questions.

Using a factor of safety of 3, as required by City Building Act, and assuming ordinary load on floors of commercial buildings as 200 lbs. per square foot, though authorities say it may run as high as 400 lbs. in some cases, it would seem to be desirable, in view of increased strength of floor, to use a longitudinal girder, if the increased combustibility is not a too serious objection. I remain,

Yours sincerely, W. WHITNEY LEWIS.

VENTILATING ROOF-SPACES.

CHICAGO, November 22, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—If the space between roof and ceiling is ventilated, as you recommend in your last issue, what will be the effect in winter if the ventilating openings are not closed? Such openings are often made where they are inaccessible, or where they are likely to be forgotten. If they are left open during cold weather, will not the upper rooms be chilled more than with a tight roof? Would it not be a better plan to close the air-space tightly and keep out the heat and cold alike by a thicker or more non-conducting roof?

Very truly yours, N. S. P.

[OUR correspondent's suggestion is well worth keeping in mind. We have, however, with the same idea, arranged for ventilating the roof-space as described, with movable shutters to close the openings in winter, but found that they were not used, and the air at the top of any warmed room in winter is so much hotter than elsewhere that the vicinity of the moving sheet of cold air would probably be little felt. No doubt, as Mr. Patton says, the best way of all is to put on a thick, non-conducting roof, of heavy plank or masonry, and the air-space under it, if any exists, will then need no ventilation beyond that required to keep the timbers from rotting.—EDS. AMERICAN ARCHITECT.]

THE BEST AND SAFEST MORTAR.

NEW YORK, November 29, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Will you give me by mail the benefit of your advice as to the best and safest mortar to use in setting a limestone (say similar to Bedford stone), and also the best *pointing* mortar to use.

By "best and safest" I mean a mortar that is good and durable, and that cannot possibly stain the stone. I have been told that Lime of Teil makes the best pointing mortar for such a stone, and good ordinary lime mortar for setting. If you agree to this, what would you recommend as the best proportions for mixing it?

Very respectfully, ALEX DOYLE.

[WE know very little about the matter, and hope our readers may be willing to help us with some information. Lime of Teil seems disposed to effloresce, as we have seen it, almost as badly as ordinary cement, but this tendency might perhaps be checked by adding a little oil or soap. Selenitic cement is of a good color, and might do well.—EDS. AMERICAN ARCHITECT.]

INELIGIBLE FOR MEMBERS OF ARCHITECTURAL ASSOCIATIONS.

TERRE HAUTE, IND., November 22, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Please answer the following in your paper: Is it proper that contractors for labor and materials, agents for the sale of iron-fences, tin-shingles, press-bricks, chimney-pots, hot-air furnaces, and such, styling themselves architects besides, should become members of the Western Association, and fellows of the American Institute? Respectfully, SUBSCRIBER.

[WE consider the action taken by the Western Association of Architects early in the second day of its session, as reported elsewhere, a sufficient answer to this question.—EDS. AMERICAN ARCHITECT.]

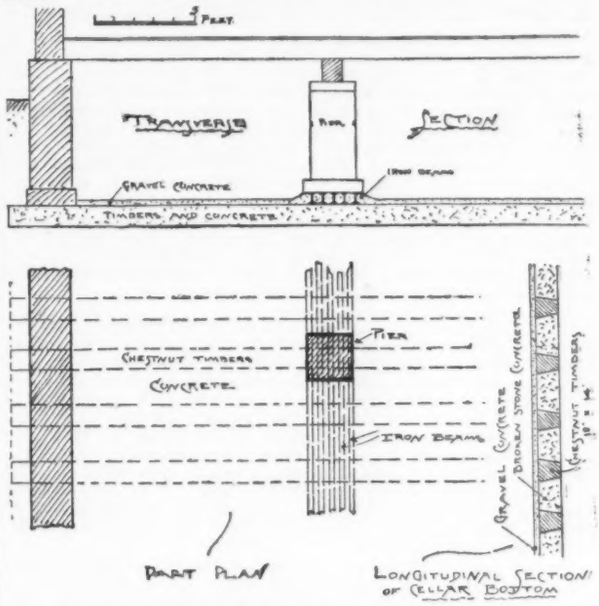
FOUNDATIONS IN COMPRESSIBLE SOILS.

BRIDGEPORT, CONN., November 22, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Having a controversy with an engineer, as to the merits of a system for putting in foundations for a certain building, I send herewith sketches illustrating the same to you, and beg that you will consider it, and through the columns of your valuable journal give your opinion upon it.

The building is designed for a warehouse, and is about fifty by thirty feet, three stories in height. It is to be erected on made ground, over what once was the bed of the harbor. There are a few feet of filling below the level of the cellar bottom, and below that the old bed of mud is many feet deep. This bed, however, has doubtless become somewhat solidified, by the heavy traffic of railroad trains over it for a number of years; the site being formerly occupied by railroad tracks. The proprietors will not pile, owing to the expense of it.



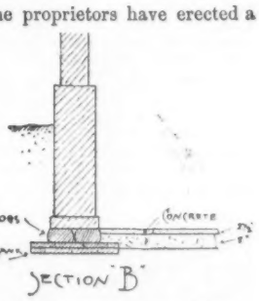
The sketches will show the system in question. Heavy chestnut timbers, sawed tapering, as shown, are first laid down, extending entirely across building, and one foot beyond outer line of cellar wall; any head-joints to be at middle of building.

The spaces between timbers are *at once* filled in with strongest broken-stone concrete, made with Portland cement, and well rammed. The walls are then built as shown. In the centre of building is a line of piers. The iron beams are laid down, extending under end walls, and the piers built upon them.

The obvious purpose of the scheme is to make the cellar-bottom a constructional part of the building, and, by making it strong enough to resist any transverse strain put upon it by a tendency of the walls or piers to settle, to prevent such settlement, unless all settles together. The timbers being built through the wall must settle with the wall (the heavy footing stones extend from timber to timber), and the timbers cannot settle without carrying with them the concrete arches. The iron beams distribute the weight from the piers over the beams and concrete arches.

The building is close by the edge of the harbor, and the cellar bottom is from three to four feet below high water; so the chestnut beams would always be wet.

Not far from the proposed site the proprietors have erected a building upon a plank and timber foundation, as shown by "Section B." Two layers of two-inch chestnut planks were laid down, crossing each other diagonally; upon these, two heavy chestnut logs were placed longitudinally, and the walls built upon them. What do you consider the comparative advantages of these two foundations? And which the better? By kindly answering these questions you will greatly oblige, Yours sincerely,



JOS. W. NORTHROP, Architect.

[WE could hardly venture an opinion as to the comparative merits of the two designs for the foundation mentioned, without knowing more about the resistance of the ground under all parts of the proposed building. It may well be that the mud on which the building is to rest is so soft, and of so uniform a consistency as to make it advisable to resort to so costly a construction as that first described, which seems well calculated for use in a very soft and uniform ground. If, however, there were any doubt of the uniform consistency of the subsoil, or if the resistance seemed such as to make it probable that the weight could be sustained on a comparatively small area, and without any danger of lateral movement of the foundations, we should be inclined to make several careful tests of the bottom of the trenches, by loading a given area until a level, from a neighboring fixed bench-mark, showed settlement, and then see if, by proportioning the known weights on the walls and piers to the ascertained resistance of the soil, the necessary spread of the foundations could not be obtained by means of such planking as shown in Section "B," without making the planking so wide that it would bend under the effect of the opposite forces of the load upon it and the reaction of the soil. This seems to be one of the many cases where knowledge and care, such as our correspondent seems to desire to expend upon the problem, are worth many dollars to the owner of the building, and although the latter may be a little impatient at first that his architect cannot solve the difficulty by happy inspiration instead of hard work, he will soon come to appreciate the advantage of having his property dealt with by one who proposes to know what he is about before he makes his decisions.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

Cremation by Electricity. — A movement has been set on foot in Italy toward erecting, in one of the principal towns, an electrical crematorium. In this edifice the corpses will be instantly consumed by means of an intense heat caused by electricity. Various European cremation societies are reported to have despatched representatives to Italy to make inquiries as to the feasibility of the scheme, which it is expected will, if successful, very soon replace the more elaborate methods now generally adopted. Partisans of cremation are sanguine that the introduction of electricity would instantly remove the objections held by many European States against the burning of bodies. Dogs — we presume dead dogs — have already been subjected to the process by its inventor with a considerable degree of success. Their bodies forthwith evaporated into nothingness, and there was perceptible none of that disagreeable odor of burning flesh which inhabitants of Woking are said so greatly to resent. — *Pall Mall Gazette.*

Big Undertakings. — Nothing seems too big for the present age, for we are continually being startled with something new and something immense, which has either been just completed, or is about to be carried out, or, at any rate, is projected or proposed. Within the last few weeks three new schemes have been either commenced or suggested in Switzerland, Greece, and Canada. The first-named scheme in Switzerland is proposed by an Italian engineer named Agudio, of Milan, for making a way through the Simplon, which he declares he can do by a tunnel of only 6,050 metres, the traction and haulage being done by hydraulic power. He says that, by this means, from 3,000 to 4,000 tons of goods could be safely transported without any breaking-up or trans-shipment of trains; while the cost of the whole proceeding would be only 28,000,000 francs.

Number 2 project consists of the bold but practical scheme of draining the Lake of Copaïs, near Thebes, in Bœotia, by which an area of a hundred square miles will be added to the territory of Greece. The acquiring of so very large a piece of land, which may be put to useful purposes, though undoubtedly one of vast importance, is not the only object intended to be effected by the proposal — the other being the destruction of one of the greatest fever-producing places in the country by reason of the pestilential malaria always arising from the waters of this lake. This alone would be an unspeakable blessing to the country round, and money should be readily forthcoming for the carrying out of so beneficial an undertaking. The rivers now flowing into the lake would be employed for irrigation and other purposes of practical utility.

Number 3 project proposes to connect Prince Edward Island with the Canadian mainland by means of a submarine railway tunnel, by which all communication can be kept open with the inhabitants of the island during the winter, a circumstance at present almost impossible, from the terribly rigorous nature of the winter climate of Canada; but Canada is bound legally to do everything that is possible to keep open a communication with this island at all times and by all means, for the accommodation and assistance of 125,000 persons who constitute the present population. The distance of the island is only six miles and a half, and the bed of the Northumberland Straits, under which the railway will be carried, presents no very apparent difficulties. The depth of water is, on the island side, 36 feet; and 10 feet 6 inches on the New Brunswick side; and about 80 feet in the middle. The tunnel will be 18 feet in diameter, and will be made of "chilled white cast-iron," in sections, these latter being bolted together with inside flanges, exactly in the same way in which the little tunnel for foot passengers under the Thames, and known as the "Tower Subway," was constructed some years ago. The cost of this undertaking is estimated at about 1,000,000 sterling. It has been well considered and highly commended, and will be brought before the Canadian Parliament very speedily, when the scheme will, no doubt, be fully sanctioned, as it has many warm supporters in the Legislative Assembly. Canada will, therefore, have her "submarine railway" long before her illustrious "mother" on this side of the Atlantic. — *Chambers' Journal*

TRADE SURVEYS

From a somewhat extended intercourse, both personal and by correspondence with a number of leading contractors and builders throughout the United States concerning the probabilities for 1887, from a railroad, manufacturing and building stand-point, we are safe in making the general statement that the coming year will be a much better year for all of the great interests than the present year has been. At the same time there is a difference of opinion felt and expressed which is deserving of recognition and which ought to enter into the conclusions. Most of those who feel entitled to speak upon these great questions take a sanguine view, and predict great activity. There are some who, remembering the sudden disasters that have befallen us in recent years, are inclined to advise prudence and a conservative course generally. The greatest danger the industries, in the general sense, have to face is the possibility of increasing capacity too rapidly, or building too rapidly, or of permitting too rapid an absorption of capital. The main point to be kept in view all agree is the maintenance of a healthy consumptive capacity both at home and abroad. The most encouraging feature is the multitude of engineering and industrial enterprises at home and abroad. Canals and tunnels are projected which will employ a great deal of capital and labor. The Panama Canal will be pushed with all possible despatch. Tunnels are projected in European countries, and are talked of in the United States, which, no doubt, will be shortly undertaken. Extensive terminal facilities are talked of by railroad companies, in addition to their enormous extensions for which arrangements have already been very largely made. All of the trunk lines contemplate expending a great deal of money next year. The Pennsylvania Company, to illustrate, proposes, besides building several hundred miles of new roads, to elevate its tracks in Jersey City, and to perfect its intricate system in many directions, which will involve a very large expenditure. The Baltimore and Ohio has enormous projects on hand which will call for the outlay of a great deal of money. It would be useless to endeavor to follow out the many projects of the leading and smaller corporations in the country. What they contemplate doing and will do will result in the opening up of a great deal of new territory, timber, mining and agricultural, and will create opportunities for building enterprises upon a large scale. Another very important movement in progress is the purchasing of large tracts of land in the South. This has been referred to before. During the past four or five weeks additional purchases have been made. Manufacturing companies have been organized, existing companies have extended their capital, and there seems to be a general outburst of enterprise among investors and capitalists and manufacturers both North and South to secure desirable locations. Within the past thirty days between ten and twelve million dollars' worth of industrial capital have been either invested or schemes have been perfected for its future investments. In Georgia, and even in Mississippi, companies are now perfecting plans for industrial enterprises, and in Tennessee a great deal of foreign and home capital has been invested in iron, timber, and fuel possibilities. A great deal of building will be done in that State during the next year. Railroad building will, of course, take the lead. The erection of manufacturing establishments will follow. Builders in Nashville, Chattanooga, and Birmingham are the authority for the statement that in those three centres alone the building that will probably be done next year will exceed in quantity the building done during the past two years. Memphis, Louisville, Atlanta, Augusta and some other Southern cities, are also promised a great revival in building, and the anticipations seem to be well justified by the well-authenticated statements of heavy investments of capital in these centres. There is, also, a little revival in the Southwest, but less is known of it because of the wider domain over which the enterprises extend, and the lesser inducements that are offered to industrial and building capital to operate in that region. Still, a spirit of enterprise has broken loose and a great deal of land has been purchased. The same is true of the mining regions of New and Old Mexico. In St. Louis where more is known of the resources of those localities than elsewhere, an immense amount of capital has been invested in mines by way of exploration, and investments in material and labor for the operation of mines. Of late years capitalists at home and abroad have lost much faith in American mining enterprises, but the confidence which St. Louis investors show in Southwestern mining-schemes is beginning to attract a good deal of capital into the Southwest, and it is probable, during the next twelve months, the investments on the part of Eastern and foreign capitalists will be greatly increased. These observations, however, have only an indirect, yet a certain bearing upon the building interests. The manufacturers of lumber in the Northwest, and of iron and steel throughout the great interior of the country have had their attention directed to the corresponding demands of the States west of the Mississippi for lumber and all kinds of manufactured products. These markets will increase their demands upon the States east of the Mississippi because of the great industrial upheaval that is in progress. Even the jobbers of our large Eastern cities are looking with increasing confidence to the west of the Mississippi States, and regard that field as one of the most valuable for their attention. There is a quiet outflow to States west of the Mississippi from States east, because of the extension of the railway system, the cheaper land, and the gradual spread of the smaller industries. The country's industries are balancing themselves. If there be any surplus of capacity in the East it is moving westward. The development of valuable coal fields throughout the far West is one of the reasons for the spread of the smaller industries. Throughout the East the same industrial conditions continue. The importation of iron and steel material and products will likely assume still larger dimensions. New York brokers are in receipt of inquiries from large mill proprietors for extensive supplies of Bessemer pig, Spiegeleisen ore, blooms, slabs, billets, and all heavy material entering into the manufacture of material for railway construction. There is not a single discouraging feature in any of the industries connected directly or indirectly with the iron trade. The lumber manufacturers in the West and South are pleased with the prices obtained, and the prospects for the heavier distribution of lumber next year. The manufacturers of woodworking machinery have been much encouraged by the orders for machinery during the past month and by the reports of agents who have been scouring the country earnestly for next year's work. The textile manufacturers throughout the New England States are watching the course of the market earnestly, but are careful not to crowd prices much beyond their autumn limits. The agricultural interests are better able to exercise control over their stocks this year than last. Thousands of farmers are holding back their products for better prices. They are under less necessity this year to part with their food supplies than heretofore. Speculators are watching the possibilities of European disturbances, and anticipate a heavier exportation of American products in any event. There is very little probability of a speculative advance in any direction, and nothing but a European broil will precipitate such a result. Over-production is not observable in any direction. The coal-producers are short of stocks all along the Atlantic coast, and only this week the anthracite producers met in conclave and decided not to advance prices. The bituminous operators met in Philadelphia on Wednesday of this week and formed a combination for the bettering of prices, and in order to avoid the cut-throat competition which has depressed prices to limits which have for years past driven the miners to engage in the disastrous strikes that have characterized four or five of the Atlantic coast coal-fields. Another influence which should not be lost sight of and to which reference has been made heretofore is the desire of money-lenders in the East to increase their loans in the West and South. This is a very important matter. Confidence has always been lacking in the integrity of borrowers, public and private, in the far-off States. The recent conduct of the new political and commercial element goes far to dispel this distrust and to strengthen the belief in the minds of manufacturers and money-lenders that there is no risk in making heavy investments, especially in reproductive channels. During the past few weeks companies have been formed in New York City and Philadelphia in order to assist in the distribution of money in the West and South in sound channels both for lending and for investments. The bulk of the money-seeking employment remains in the control of its possessors. It is doubtless the better policy. Speaking generally, the industrial situation continues to improve. The depression in Great Britain has been exhausted. Reactionary influences are at work, increasing exportations are assured, better prices are asserting themselves, consumptive demands are expanding, and the general healthy condition of trade and industry is manifesting itself. This improvement affects American markets, and is strengthening demand and stimulating production in all of the greater industries, and the smaller ones are feeling the reviving influence.